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Letter to the Editor

Editor, Nature Magazine:

I was interested in the article in your March issue entitled, "I am a Hunter," wherein the writer pondered the possibility that, as a hunter, he may have missed something in his contacts with the out-of-doors, for his comments tend to confirm my own conclusion that the hunting fraternity, by its predatory attitude toward wildlife, shuts out the fuller enjoyment of Nature's world that is attained by people whose attitude is more sympathetic. I have often been impressed at the number of people whose only action at seeing a pheasant fly across the road, a flock of ducks on a pond, or a deer bounding away in a meadow is to exclaim, "If I only had a gun!" Hearing such a response, the non-hunter would seem justified in concluding that such people would find little satisfaction in a day spent afield with nothing in their hand more lethal than a lunchbox, and that once a person casts his lot with the sportsmen he automatically limits the period in which he can enjoy the out-of-doors to that fortnight or month in which he can legitimately take his gun afield and get in those tempting shots which are only tantalizing impossibilities the remainder of the year. The validity of the above conclusions would doubtless be denied by many sportsmen, but the only clue the non-hunting individual has regarding the innermost longings and aspirations of the hunter is his vocal expression of those feelings, and his actions, and most sportsmen would have to admit that their words and actions seldom hint of much enthusiasm for wildlife apart from its sporting appeal. At a sportsmen's meeting I heard one enthusiast exclaim, "The value of a duck is nil, except to shoot." This general attitude of sportsmen toward wildlife is no worse than that of the lumberman toward a forest or a miner toward a geological formation, but is hardly conducive to the year-round, life-long satisfaction that a John Muir or a Gene Stratton-Porter achieve from their experiences with the wild. A pheasant flying across our path reminded one of my friends of the time when she lived near city limits where pheasants were still to be seen, and her husband, whom I believe to be a fair-minded sportsman in the usual sense of the term, was "nearly wild" because the season was closed in that vicinity at all times. Because he thought of these birds as "targets" only, he cut himself off from the continuous enjoyment of the beauty, intelligence, and mysterious ways which characterize all of Nature's intricate creations and whose contemplation, in these unsettled times, so often restores a sense of peace and a confidence in the future for those who have learned to appreciate the wild creatures and recognize the common bond that unites them with man himself.

A duck hunter goes out in the brief

season when he is permitted to enjoy the wildlife in the only way he knows how, and we read in a sporting magazine the subsequent account of his sensations as the birds swung into range. But about a hundred years ago another man also watched the flight of waterfowl against an evening sky, and then he too sat down and wrote about it, and most of us have read his account also, the last lines of which read as follows:

"He who from zone to zone
Guides through the boundless sky thy
certain flight,
O'er the long way that I must tread
alone
Will lead my steps aright."

Two men's interpretation of a similar experience, but I suspect the latter, though he may not have understood the refinements of ballistics, the construction of a hunting blind, or the gunsight and charge necessary to drop a buck or the leader of the V, was much nearer to the soul of the out-of-doors and the spirit of the wild than is the sportsman, who we are so often reminded in the daily press is supposed to be the only true outdoorsman and the sole exponent of those primitive and adventuresome instincts which distinguished our ancestors and are so essential to the red-blooded American of today.

CATHERINE A. HURLBUTT

Wild Flower Chart

Presenting ninety-eight full-color pictures of wild flowers, with accompanying brief comment, a Wild Flower Chart is available from *Woman's Day*, 19 West 44th Street, New York 19, New York. The photographs were made and assembled by Samuel H. Gottscho. Copies of this chart are available for twenty cents for the chart, plus fifteen cents to cover container and mailing to any one address.

To a Mud Dauber

The Ways of a Mud Dauber, By George D. Shafer. Stanford, California. 1949. Stanford University Press. 78 pages. Illustrated. \$2.50.

Dr. George D. Shafer is recently retired from the post of Professor of Physiology at Stanford University. His acquisition of "Emeritus" before his title enabled him more zealously to pursue his hobby of experimentation with bees. While thus engaged, he made the acquaintance of a thread-waisted, mud dauber wasp, known to entomology as *Sceliphron cementarium*, and it is to one of these wasps, known to the author as Crumple-Wing, that this interesting little book is dedicated. The book is, in fact, the result of a five-year study of this species, and is its life history with interesting sidelights. It is entertaining reading and notably informing, as well as being a real contribution to entomology.

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BRITISH RAILWAYS

Nature in Print

By HOWARD ZAHNISER

RIDING across the continent in a stainless steel streamliner, feeling the vast expanse of the prairies, the grandeur and magnificence of snowy mountains, and at the same time admiring the skill, the neatness, and precision of the engineers, the designers, the manufacturers, the operators—the human beings who have created such a railroad and such a vehicle—seems, at the moment, remarkably comparable with contemplating life and its manifestations through the reading of a book written by a great writer, edited with skill and understanding, exquisitely illustrated, and manufactured in the beauty of good typography.

Exquisite is the word for either, but to have read such a book on such a journey, and then to be approaching a discussion of the book while ascending the front range of the Rocky Mountains, all covered with the fresh whiteness of snow—on the last day of March, all brilliant in sunshine—is to be quite at a loss for a word to contain it all.

"Such traverse!" Emily Dickinson might exclaim.

In both book and train we are so neatly contained, and we travel through such vastnesses.

"I look at the sunshine," says our author, Richard Jefferies, "and feel that there is no contracted order: there is divine chaos, and, in it, limitless hope and possibilities." Ah, but there is a consummate orderliness about this train that I think I comprehend, even as I look out from it at this incomprehensible universe—and also about this book, wherein I read, "how much more grandeur, beauty and hope there is in a divine chaos—not chaos in the sense of disorder or confusion, but simply the absence of order—than there is in a universe made by pattern."

Perhaps it takes a chaos to contain orderliness, which is so much to be cherished; which I so love. Perhaps that is why one, on such a train—one with such a book—so enjoys both situation and outlook.

The Old House at Coate and Other Unpublished Essays, by Richard Jefferies, is certainly a book to induce contemplation, as well as one to be enjoyed for its descriptions. The wood-engraving illustrations by Agnes Miller Parker—so sensitive to the thought and feeling of Jefferies, yet so creatively expressive—are themselves a peculiar treasure. The volume is also of special interest as a testimony to the devotion of Samuel J. Looker to collecting Jefferies' books and manuscripts, editing them for republication, and keeping them in the minds of readers. Mr. Looker has provided the volume with an explanatory and appreciative introduction, and has appended some biographical notes and some textual notes that relate this volume to Jefferies' already published works, as well as to enrich the reader's enjoyment otherwise. There is much interest for many of us in Mr. Looker's listing in his notes the word changes that Jefferies had made on his manuscripts. The help of all these notes is realized without interruption on the reading pages. They add further evidence of Mr. Looker's care and devotion, as does also the list of works, by and about Jefferies, which concludes the volume. Yet all these are only added features to these writings

of Jefferies that can so delight and inspire, which those who know Jefferies will wish surely to possess, and which those who have not yet read this English essayist of Nature may well take as a too-long-deferred introduction.

It is interesting that these hitherto unpublished manuscripts should be so well representative of their writer's most significant work. Richard Jefferies, who was born just a hundred years ago last fall, and who died in 1887, is known as a writer of descriptive Nature essays with the charm of England's countryside, especially as an observer and writer who revealed the natural scene so usually overlooked near cities; *Nature Near London* is a well-known descriptive title from his works. Jefferies also was deeply interested in human beings, especially in country people, and he was intensely introspective. His mystic, poignant autobiography, *The Story of My Heart*, is one of the profound revelations of the human soul. Mr. Looker calls his own reading of *The Story of My Heart*, at age thirteen, "a landmark in my life." All these characteristic aspects of Jefferies' genius are well presented in the manuscripts now first published in *The Old House at Coate*—so well presented that the volume will

represent Jefferies without injustice in any library.

It has never seemed to matter to me that Jefferies wrote of a countryside I have never seen, for he shares with me as his reader experiences that are near enough to my own, and thoughts that seem so easily related to my own, that he enriches my enjoyment of my own countryside, and my efforts to define my own thoughts. It is good to note that interest in his writings is mounting. It will, I am sure, do us all good to have more of our fellow human beings come under his influence.

"Jefferies believed in the good life," says Mr. Looker in his introduction to *The Old House at Coate*, "and with all his powers he strove to bring it about through the interpretation of Nature and the unfolding of her healing and consoling power. He understood, and was the wise champion of both the English farmer and peasant. His whole work is illuminated with the spirit of his utterance in *The Story of My Heart*, where he exclaimed: 'How pleasant it would be each day to think, today I have done something that will

tend to render future generations more happy. The very thought would make this hour sweeter.' He has much to teach the modern mind."

It is, I find, irresistible to continue the quotation to the end. Mr. Looker has, in fact, in his introduction written the ideal review of this work, and its conclusion, to those of us who so heartily agree with him, is better quoted than paraphrased or duplicated.

"Jefferies," he writes, "will show us the beauty of each season, the little simple things of the earth; he will describe the bird in the wood or hedge, the wild flowers of the field or wayside, the wild thyme of the Downs, the clematis in the lane. . . . Jefferies makes us see the July fly which goes, whirling its wings, over the grass; the swallows which dart over the rippling river, the spotted trout reposing in the deep pool under the bridge. The reeds are rustling in the breeze, the boisterous wind is blowing over the English headlands from the sea. Animals and birds of the countryside in the spring are 'happy with their young.' He is the prose poet, too, of the great Downs, native to the sky, which he loved so well. And behind all this pageant of living, touched to ecstasy by Jefferies' creative spirit, is his teaching that to return to Nature is to achieve beauty and harmony. It is to forget the artificiality, the fevered, unreal

Night in the Valley

By JOHN GALLINARI WHIDDING

(Yosemite)

How lovely in the valley was the light
Of stars in God's broad canopy of jet
That shone with promise of a moon not yet
Full-risen on the gray and ghostly height.
Then, quietly, the mist moved silver-white
Above our heads and, on the parapet,
The pointed pines stood out in silhouette—
Like arrows in the quiver of the night.

We slept, assured that some tall sentinel
Kept silent guard across the crystal haze,
And as our dreams set seals upon the spell
Came morning, blue and clamorous with joys.
There was enchantment brighter than a song
To warm the heart how many winters long!

activities of town life and commercial chaffering. It is to sleep with the stars above you and rejoice in the dawn; to see and appreciate the changing picture of the sky; to note with loving and observant eyes the sequent colours of the year; to mark the varied tints of the leaves in spring as in autumn, and to observe the shapes of trees and flowers; to be in sympathy with both animal and plant life and to understand the rhythm of the earth. This is to be reborn into a new life, and to awake into a fresh and creative world of thought and feeling. This is indeed the true life, and all else is illusion."

Samuel J. Looker writes thus on the basis of close to a lifetime of intimacy with Jefferies' writings, and I copy it down from his pages with the assurance that comes from much Jefferies reading of my own. Yet I am confident that any reader can verify it for himself simply from the material in *The Old House at Coate*. First of all, in this book is the reminiscence of boyhood at the old house, then three essays on the country near London, two on "The English Breed," an essay called "The Squire and the Land," and finally a profound, prayerful meditation entitled by Mr. Looker "The Life of the Soul." Representative in range, all right, and also in quality, I believe, I count now a dozen and a half passages marked for illustrative quotation. Three must suffice.

One from the boyhood reminiscence is the subject of one of Agnes Miller Parker's most expressive, most beautiful woodcuts. "I went to drink at the spring," wrote Jefferies. "Stooping in the rocky cell, I lifted the water in the hollow of my hand. . . . The sunlight gleamed on it as it slipped through my fingers; thus I had the sun, too, in my palm. . . . The sun shone and I said: Give me more life. I held out my palm to hold the sunlight like water. Let me be filled with the life of light as my hand is filled with water when I dip from the brook."

Another quotation may represent that influence for keeping alive the wilderness that Jefferies exerts, and which is so truly pertinent today. It happens that it is the squire in "The Squire and the Land" who says:

"I don't like the idea of our becoming altogether artificial. I hope something of the forest feeling—the spirit of the forest—will survive in everyone. . . . If ever it should happen that our forests and hills should be cultivated, and every trace of wildness smoothed out of the country, do you know, I verily believe it would become necessary to plant forests and lay down hills with turf: in short, to make national preserves."

As I ride along, still in this streamliner, late now in a dark, cloudy afternoon, across the sagebrush desert of central Colorado (with no signs now of winter whatever) I still find this day's contemplation of Jefferies much worth-

while to me. He too, I think, would admire this stainless steel train of cars moving me so neatly (as my eleven-year-old son would say)—so neatly toward the Sierra Nevada, where I want to be. But surely we all agree with Jefferies that we do not wish to be altogether artificial. Whatever human order we contrive may best be contained in what he called the divine and hopeful chaos, and our little areas of chaos may well be trivial in a sublime universe, too. Surely we know that our spirits are not well nurtured, are, as it were, undernurtured if we spend all our days and nights within the scheme we ourselves have constructed. There is a question that stands out strikingly on one of these pages, and echoes for quotation: Why, wonders Jefferies—

"Why have I not gone forth for this soul life, searching for it more in the forest and by the sea?"

The Old House at Coate and Other Hitherto Unpublished Essays. By Richard Jefferies. Edited with an Introduction and Notes by Samuel J. Looker, Cambridge, Massachusetts: Harvard University Press. 1948. 215 pp., with 24 illustrations from wood engravings by Agnes Miller Parker and bibliography. \$3.75.

National Park Plants

Woody Plants of the Western National Parks. By Virginia Long Bailey and Harold Edwards Bailey. Notre Dame, Indiana. 1949. The University Press. 274 pages. Illustrated. \$4.00.

This is Monograph No. 4 of The American Midland Naturalist and is brought out under the editorship of John D. Mizelle. Our National Parks, to those interested in botany, are great outdoor laboratories for study, becoming more so as their flora is better known. This immediate volume is a guide to the identification of more than 560 woody plants found over an area of roughly 11,600 square miles of our western parks. These plants are found from a few hundred feet above sea level to 14,500 feet, thus covering a wide range of plant zones. An identification guide is supplied, followed by discussion and figuring of the plants discussed.

From Breeze Hill

Memoirs of a Rose Man. By J. Horace McFarland. Emmaus, Pa. 1949. Rodale Press. 144 pages. Illustrated. \$3.00.

This posthumous volume by the late and beloved J. Horace McFarland consists of collected "Tales from Breeze Hill," and is concerned primarily with roses. Although the author loved people, he loved roses fully as much, and any rose lover will find this little book a treasure. As Liberty Hyde Bailey says in a preface, this book will keep alive the influence of Horace McFarland, and anything that does that is justified.

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Virginia Hot Springs

The Valley Road. By Fay Ingalls. Cleveland. 1949. The World Publishing Co. 293 pages. With chapter headings and end map by Margaret Lowengrund. \$4.00.

One of the most fascinating pages in American history is written about the spas and springs of Virginia's Shenandoah Valley. The list of famous names of those who "took the waters" at these resorts during the nineteenth century is a long one, and the social life that centered around these spas is fascinating. Many of the spots have passed out of the resort picture, leaving some as ghost vacation communities. Through many vicissitudes, however, such places as Hot Springs and Warm Springs carry on the valley's tradition. The name of Ingalls is intimately associated with Hot Springs, for it was the author's father who was deeply concerned with this resort in the latter part of the past century and the first part of this. And the author, given six months to live by the doctors, found health and strength in the Valley. To anyone who has roamed this region, this book is fascinating reading, and for those who do not know the Valley Road it is something to lure them to that knowledge.

Evolution

A New Theory of Evolution. By Sir Arthur Keith. New York. 1949. Philosophical Library. 451 pages. \$4.74.

Space does not permit an exhaustive and evaluative review of this interesting book, finished on the eighty-first birthday of this distinguished anthropologist and student of man's history. Suffice it to say that it is deserving of reading for the theories it puts forward, and for its summary of what is known about the past of *Homo sapiens*.

Plant Ecology

Field Manual of Plant Ecology. By Frank C. Gates. New York. 1949. McGraw-Hill Book Company. 137 pages. \$3.00.

This book is designed to provide exercise and experiment instructions as a part of plant ecology studies and supplemental to standard texts on this subject. It is a practical, simple guide to field work that should be immensely valuable.

Hybridization

Introgressive Hybridization. By Edgar Anderson. New York. 1949. John Wiley and Sons. 109 pages. \$3.00.

This is an important book in a specialized field of research indicated by its title. It is the first in Wiley's Biological Research Series, and its author is geneticist at the Missouri Botanical Garden and Engelmann Professor of Botany at Washington University, St. Louis.

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TEN YEARS OLD

By ELIZABETH LOCKWOOD

THE National Association for Biology Teachers has celebrated its tenth birthday. Proper observance was lost in the annual meetings in Washington last December, due to the combined programs with the American Nature Study Association and the National Science Teachers Association. However, the members of the National Association of Biology Teachers are proud of their ten-year-old "child," and it is only proper that a resumé of the activities for this decade be reviewed. The NABT, as it is more often known, became a fledgling organization in New York City July 1, 1938. Eighteen persons, vitally interested in biology, foresaw the need for a co-ordinated national organization of biology teachers; one that would band them together in common interests, plans and opportunity for growth. It should be not only for biology teachers themselves, but for the whole field of persons interested in biological sciences. Today, more than ten years later, NABT has graduated from the fledgling stage to a full-grown, mature organization having 1550 members from all States in the union, and 52 members from other countries.

The proudest accomplishment to the majority of members is the official publication, *The American Biology Teacher*. The quality of our monthly publication is unusual, both in its expert official staff and in the high standard of material that has been published. Much of the praise for this goes to its present editor, Dr. John Breukelman, and to its previous editors, I. Alex Herskowitz and Edward Colin. These three literally evolved the journal from an embryonic stage.

Looking back through the journals of ten years, one often finds the names of Oscar Riddle, D. F. Miller, Arthur O. Baker, B. C. Gruenberg, Paul B. Mann, E. L. Palmer, Helen Mank, M. A. Russell, Charles B. Price, M. C. Lichtenwalter, George W. Jeffers, P. K. Houdek, Prevo Whitaker, Helen Trowbridge, Brother H. Charles, Alan A. Nathans, E. C. Colin, Lee Yothers, W. A. Betts—all who have given many and varied contributions as well as loyal membership. It is due to their continued service and loyalty that the *American Biology Teacher* has become such a valued educational journal.

It is interesting to compare the first issue of *The American Biology Teacher* of October, 1938, which had 24 pages and

three leading articles, with the number one issue of Volume 11, ten years later. This January, 1949, issue was devoted to the "Effectiveness of Science Teaching" and had six leading contributors. The size had increased to 32 pages.

Taking a look at the listed staff, one finds seven of the original members of the Advisory Staff still "on call" ten years later. It is due to the loyalty of such persons, including B. C. Gruenberg, I. Alex Herskowitz, George W. Hunter, M. C. Lichtenwalter, D. F. Miller, Oscar Riddle, and Edmund W. Sinnott, that the guiding policies of the publication have maintained their high standards and quality. On the editorial staff are three members of the original group of 1938—Charles C. Herbst, M. A. Russell, and B. Bernarr Vance. Surely such loyalty, effort and real work over a ten-year period for these ten persons must have proved rewarding to keep them alert and willing to help.

Glancing back through the ten volumes of *The American Biology Teacher*, one is impressed by the abundant contributions and suggestions for classroom ideas and techniques. This has been one of the main "drawing-cards" for continued membership. A new idea for the classroom or laboratory is like a "shot-in-the-arm" for a biology teacher! The journal testifies to the willingness of the members to share with their ideas. Out of this sharing has come a warm friendliness that is unusual in a national organization.

For those members who are privileged and able to attend many of the annual meetings held with the American Association for the Advancement of Science, the reunion with friends—seen but once a year from over the country—ranks next in importance. The gathering is like a family reunion, for the NABT is quite like a family in that their members all have similar interests and hobbies. It is easy to greet old friends and to gain new ones at these gatherings.

NABT is not a large organization, and has no aspirations to be larger than that necessary for financial safety. It is the friendliness of the organization that is responsible more than any other factor in making new members "old members." One even feels this professional friendliness reaching out when reading the monthly journal. This is probably because biology teachers are the contributing authors, with the majority of the articles to be published sent in through an interest in friendly participation in their own magazine. The personnel and membership of most organizations of ten-

years' standing are radically different at the end of the decade than at the beginning, but this has not been so with the NABT. While many new names have been welcomed, the "founders" are still with us lending their help and guidance.

During the spring of 1949, I was in the South in connection with my work. I met several biology teachers. One of these had never attended the annual meeting at Christmas time. She did so this last December in Washington. After introducing her to some of the members, chatting together after a session, she later made the remark, "I had not realized that biology people were so friendly. Some of them were authors of books that we use, and it was so interesting to meet famous people." The NABT does have "famous people," but they are the same as the many every-day classroom teachers who feel the same urge to get together and talk over mutual problems. Stimulation and imbued interest are always the result of these "get togethers," whether at the annual meetings or at regional ones.

In December, 1946, the American Nature Study Society affiliated with the NABT as a partner in planning meetings—for kindred interests in Nature study and elementary science prove an important integral part of a program in biological sciences. The two organizations can do much to help each other, both, in turn, working with the National Science Teachers Association for a more concerted effort toward a unified, coordinated science program from the first grade through the college grades. This unity has proved itself in the caliber of the annual meetings. Combined planning has improved all three organizations.

And so, in 1949, members of the NABT look forward to a happy, successful maturity of their organization. We have gone through our "growing pains," and we do not have to worry about "geriatrics" for a long, long time—in fact, never, if our present enthusiastic membership stays by to help us over the inevitable hardships that arise occasionally, and to help us to take inventory ten years from now.

Do you want to join our group? You will be welcomed to the fold. Also, plan on attending the annual meeting next December in New York City. A major part of the program will discuss techniques and ideas for improved classroom and laboratory teaching. Plan now to contribute your "pet idea." For more information about NABT, write to our Secretary-Treasurer, John Harrold, 110 East Hines Street, Midland, Michigan.

It's a Free Country

Someone sent us a page from the Henderson, Kentucky, *Gleaner and Journal* for April 10, marking a letter to the editor, which the editor, Leigh Harris, titles "A Sportsman." Reading this letter, we thought it a fine piece of satire; reading it again, we were not too sure that it was not seriously intended. We wonder what our readers would think? Here is the letter:

"Is this a free country or isn't it? I was shooting birds the other afternoon when some damn fool man who saw me said, 'Don't shoot any birds around here.' I said I'd shoot birds any place I wanted to and it was none of his business. He said the bird I'd just shot at was a dove and there was a closed season on doves. I said I didn't have any closed season, it was always open season for me. He asked me my name, I didn't tell him. I'm proud of my name I'm an American and I'm free to do anything I want and I don't have to tell any body my name. The four little kids with me heard me tell him. They knew I'm too big to have any body tell me what to do. They want to grow up to be like me.

"I've got an air rifle and when I want to shoot birds I'm going to shoot birds and nobody's going to stop me. Hell, this fellow didn't know I'd just shot a mocking bird. I saw it light on a hedge and before I could shoot, it hopped inside the hedge. I looked in and finally saw it on a nest. I sure fixed that bird. It just fell over and kinda fluttered a minute. I pulled him out and then I saw there were four eggs in the nest. Boy that was some shot—five birds with one shot counting the eggs.

"After I shot at the dove I went on down the valley but I didn't get any real good shots the rest of the day. That fellow made me mad telling me what I can do. Mister Harris can't you help keep people like that off of me?

"Next year my dad is going to get me a .22. I sure hope there are lots of birds next year. A FREE AMERICAN."

Immature Insects

How to Know the Immature Insects. By H. F. Chu. Dubuque, Iowa, 1949. Wm. C. Brown Company. 234 pages. Illustrated. Spiral binding, \$2.00; cloth binding, \$3.00.

This is one of the "Pictured-Key Series" edited by Harry Edwin Jaques, and is an interesting addition to that important group of Nature reference works. The author is zoologist at the National Academy of Peiping, China, and was a visiting professor at Iowa Wesleyan. While we have a quite good knowledge of the form and habits of mature insects, the knowledge of insects in their immature forms, which so often differ so radically from the mature forms, is not as thorough. The author has, therefore,

brought between covers an illustrated key for identifying the orders and families of many of the immature insects. He has also supplied suggestions for collecting, rearing and studying these. Although the information contained in this book is scattered through other entomological texts, it is here gathered in a manner that can properly be described as unique.

Science in Progress

Science in Progress. Edited by George A. Baitsell. New Haven, Connecticut, 1949. Yale University Press. 322 pages. Illustrated. \$5.00.

This is the sixth volume in the Science in Progress series. It includes eleven papers, seven of which were based upon manuscripts originally prepared for the Sigma Xi National Lectureships during 1947 and 1948. H. D. Smyth, John A. Wheeler, and Ernest O. Lawrence treat with the field of Nuclear Physics; Glen T. Seaborg, L. Zechmeister, and Stanley Pauling with Chemistry; W. M. Stanley and René J. Dubos with Medicine; G. W. Beadle and A. H. Sturtevant with Heredity and Evolution; and Charles E. Kellogg with Modern Soil Science.

Worthy Conservation Reading

Every month a pile of reading matter, pamphlets, magazines, reprints and releases—mounts on the southeast corner of our desk. Somehow we eventually manage to work our way through these, reading all that time will permit. In recent publications we have come across articles of particularly valuable conservation interest. Space does not permit long review of these, and such review might well be an injustice to the original. We would recommend as worthy reading, however, the following: "Effects of Damming Ozark Springs" by Julian A. Steyermark in the *Missouri Botanical Garden Bulletin* for February, 1946; "Protecting the Land from the Raindrop's Blast" by W. D. Ellison in the *Scientific Monthly* for April, 1949; "Education Has a Stake in the Western Lands Problem" by Arnold E. Joyal in the *National Education Association Journal* for April, 1949; "A Conservationist's Philosophy" by Alexander F. Skutch in *Audubon Magazine* for January-February, 1949.

Ohio Forests

"The Native Forests of Cuyahoga County, Ohio" is the title of a 90-page bulletin of the Cleveland Museum of Natural History. It is the first bulletin of The Holden Arboretum. The author is Arthur B. Williams, and he treats with the location, topography, drainage and climate, the general ecological relationships of these forests, and provides an annotated list of the native trees and larger shrubs. The bulletin is available for one dollar.

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The School Page

By E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

WHAT'S A LUCKY CLOVER LIKE?

MOST of us have spent time sitting on a lawn looking for four-leaved clovers. Some seem to think that there is a sort of magic associated with an abnormal leaf. There is much more magic involved in being able to recognize one clover-like plant from another. In one location, one kind of clover is helpful. In another place it may be crowding out a much more useful species. What can we do about it? Well, first we can learn to tell one from the other. Then we can tell whether we are lucky to have this clover with us, or whether luck is against us. There is nothing whatever of value to a four-leaved clover. But the happiness of your own state, and of our world economy, may depend in no small degree on the way we manage the clover-like plants of our neighborhood.

If you will glance through the article "Some Clovers and Their Kin," on page 280, you will find some help on recognizing different clovers. Take the chart section out on the lawn with you. Find there some plant that you think is a clover. Surely, you can tell whether it is smooth or not. As the chart will tell you, if it is smooth, it may be white clover, alsike clover, sweet clover, golden hop clover, or strawberry clover. Put all the smooth clover leaves you find in one pile that you feel is probably confined to one of these kinds. You may have to resort them a bit later, but that will serve to give you a better acquaintance. If the plants are definitely hairy, they are possibly red clover, mammoth clover, black medic, alfalfa, or, maybe, some of the hop clovers. Your pile of hairy or fuzzy clovers will probably include some of these plants, although you will find, for example, that alfalfa may be either smooth or hairy.

Now, let us go back to our smooth clovers to see what we can do with them. In gathering your specimens, you could easily notice whether the plant was erect, or whether it was trailing and rooted freely at the joints. If it trailed and rooted freely it probably was a white clover of some sort, although it might well have been a strawberry clover. How are you going to tell which? Well, your chart will show you that there is something different at the base of each leaf. There you will find what looks like a leafy structure that seems to bind the leaf-base to the stem. Botanists call this a *stipule*. If this stipule is broad, the chances are that your plant is a white clover. If it is long and narrow, it may be a strawberry clover.

Now let us suppose we are agreed that our plant is a white clover. Let us read all we can about it. We will find that the under sides of the leaves shine, and are not dull as they are in alsike clover. We will find that the veins of the stipules are purplish, and, if they are not, we feel that maybe we made a mistake. But if the plant agrees with all we find about white clovers then we may want to know the kind of white clover.

Our chart tells us that there are at least three kinds of white

clover. It says that one of these has flowers in clusters of maybe eighty flowers, while the other two have flowers in clusters of not much more than thirty. Surely we can have a little fun counting these flowers to get a clue to the variety of white clover we have with us. Suppose that it does have as many as eighty flowers. Then, we should recognize that the leaflets seem to be relatively large, as contrasted with other similar leaves nearby. With this to support our views, we may conclude that our white clover is a Ladino white clover, and the chart will tell us whether this is desirable or not, and where Ladino white clover came from.

Now, let us suppose that there were only about thirty flowers in the flower cluster of this white clover. The question then arises as to whether we have a wild white clover or a Dutch white clover. Our chart tells us that wild white has very small leaflets and Dutch white has medium-sized leaflets. With that to help us we may make up our minds about the clover we find.

"But," you may say, "what good does all this do? Why not be satisfied that the plant is just a clover and let it go at that?" Well, if we read our chart further, we find that Dutch white clover is usually an annual or biennial, while our wild white clover is a perennial. This means that, unless we do something about it, the chances are good that, in a year or so, our Dutch white clover will not be available to help our lawn. But, if we have the wild white clover with us it may stay for a good long time. Surely this is worth knowing.

Now if we study clover further we may want to see just how big a wild white clover is. We start gently to pull up a stem to find some place where it is attached to a central, deep, root system. We may have to pull up a stem a yard or more long before we find the right place. Then, we keep at it, and, sooner or later, we may see that only one wild white clover plant may cover a space four or five square yards in extent. This means that if the plant is killed by some means we will suddenly have a lawn without any, or many, plants for a number of square yards. This means that, if possible, we may want to see to it that, should the root system be broken by a freeze in the winter, it might better be pushed back together by rolling the lawn in the spring.

The point of all this, of course, is that a few little studies that we begin on clover lead us to understand why we do certain things with our lawns and with our fields. Our charts will tell us how these plants provide superior foods to cattle, which supply us with milk, and our surplus milk helps the children of other parts of the world. We learn that, properly managed, our clovers may make an acre of soil produce as much as five or six acres would produce if improperly managed. Then, when we read the papers that tell of all the hardships the people of the world must face, we wonder why they do not learn how to manage their clovers so that they can have as good meals as we, and so that they too may live happily off the lands that were left to them by their ancestors. Surely, with all these things in mind, it paid us to sit down on the lawn for a few minutes, with our chart before us, and to look at a few common little clovers.

I hope that you enjoy doing this half as much as I have enjoyed telling you about it, and as I have enjoyed telling others about it so that, maybe, they can tell you. Helping others in school is something that the clover does. Grown alone it does fairly well, but grown with other plants it just outdoes itself. So keeping what you know to yourself is all right, but sharing it with others helps everyone. So please join our lucky clover club and help others understand clovers and their kin.

Dark Grandeur

By EDWARD McNAMEE

Cavil not at the dark,
For few blessings, it mars.
Though forbidding, its mark,—
It does bring us the stars.

Contents Noted

IF ALL the proposals for special commemorative issues of stamps were laid end to end—which would probably be a good place to lay most of them—they would stretch quite a way. Besides the proposal for a stamp to immortalize, philatelically, the one-hundredth anniversary of the Angora goat, other issues in the Nature field are proposed to the current Congress. Senator Mundt proudly urges a special series of three-cent stamps “to acquaint the people of the United States and of foreign countries with the beauty and grandeur of the carvings on Mount Rushmore in the State of South Dakota.” Representative Key of West Virginia would have issued a stamp “depicting the Bluestone Dam at Hinton, West Virginia, in commemoration of the great Kanawha River Basin flood-control plan.” Representative Le Fevre of New York proposes a stamp commemorative of John Burroughs, poet and naturalist. Senator Magnuson of Washington would have issued a stamp in honor of the Olympic National Park, and the Legislature of Washington urges a commemorative issue “recognizing and honoring the Lake Washington floating bridge.” These are only a few of the flock of current commemorative proposals, all of which, if adopted, would send soaring the number of philatelic inmates of institutions for the mentally ill, or of the poorhouse.

ALWAYS on the lookout for suggestions that will aid individuals who wish to set aside their property as a wildlife sanctuary, we have come across a recent program adopted in Oregon. Under this plan the Oregon State Game Commission will enter into a contract with a property-owner whereby the latter can set aside his property as “a wild bird and game refuge.” The idea has the objective of increasing the wildlife through natural propagation. The property-owner agrees not to kill any wild game on the property, or allow others to do so, for the five-year period of the contract. The State, in turn, will post the land, providing signs proclaiming, in large letters, that it is a game refuge, set aside cooperatively by State and owner “for the purpose of protecting and increasing upland game birds.” The State agrees to enforce this protection, which gives the lands involved an official standing not vouchsafed areas merely posted by the owner. While the objective, of course, is to provide additions to the harvestable crop of game birds and mammals, some of which move out to other areas, this plan does give the property-owner about the best opportunity to maintain a sanctuary that we have seen. Floyd Kelly of Maupin, Oregon, writes that this agreement has been operative on his property for more than a year and “the result is amazing.” The duck population on a pond in the area has in-

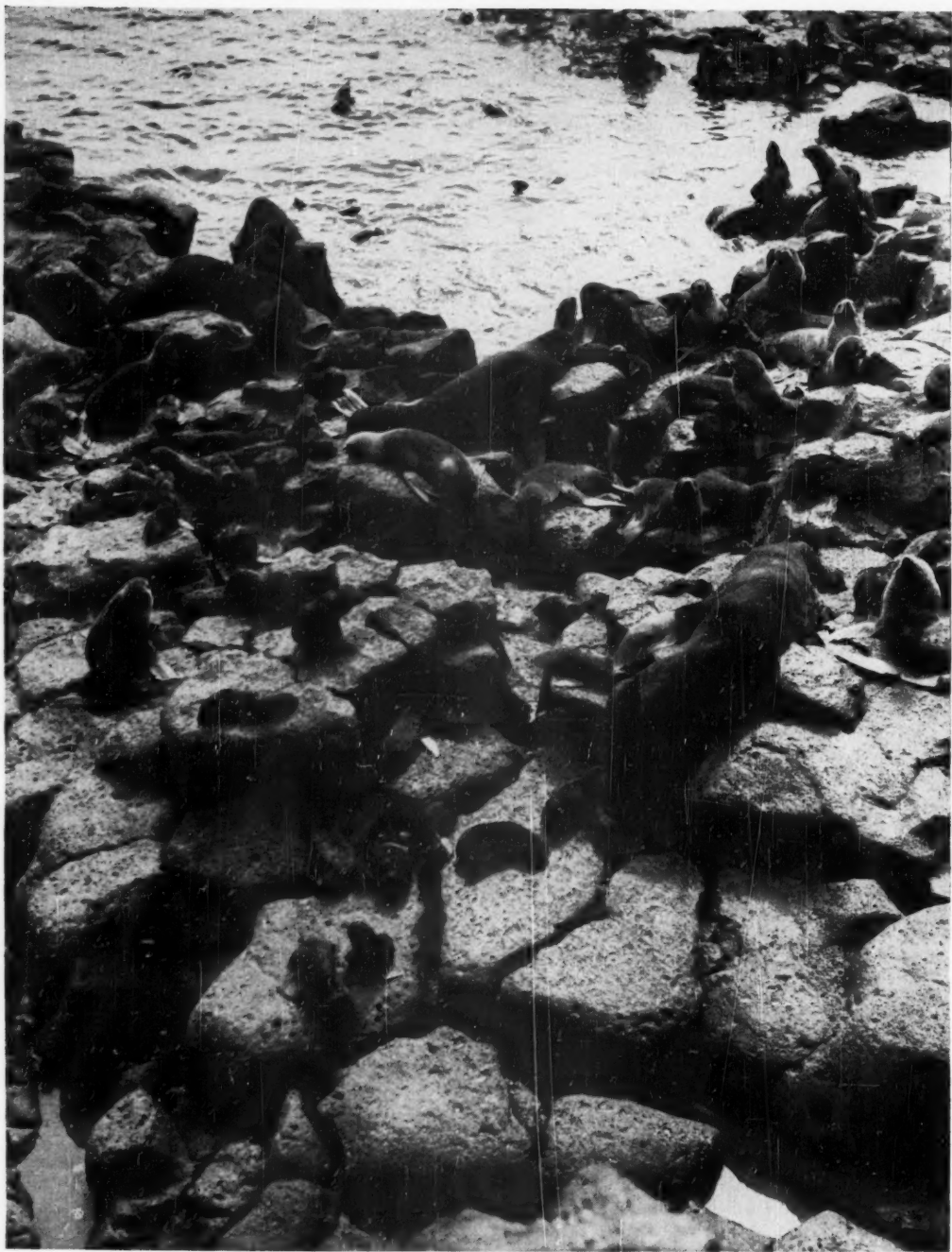
creased tremendously. Mr. Kelly adds: “Hunters’ operations were directly responsible for this refuge being set up. The pond was unposted in 1947 and the slaughter was sad to see. They did not stop with ducks, but shot everything in sight.”

ANYONE who would build a large and beautiful hotel, which attracted a full complement of guests, and then try to keep it up with an inadequate staff of chambermaids, porters, waiters, housekeepers and other essential personnel, would soon lose his hostelry to some more astute operator. Neglect is a ruinous thing. Yet we have built up an incomparable system of National Parks, the property of all the people, and fail to provide them with adequate funds to maintain them. Nearly thirty million people visited these areas during the 1948 travel year, yet Congress now chisels down the needed appropriations necessary to the proper maintenance of these areas. The National Park Service cannot hire, with the funds available, enough “housekeepers” to take care of the increasing number of guests. It is the most senseless “economy” imaginable, particularly when considered in the light of other lavish appropriations.

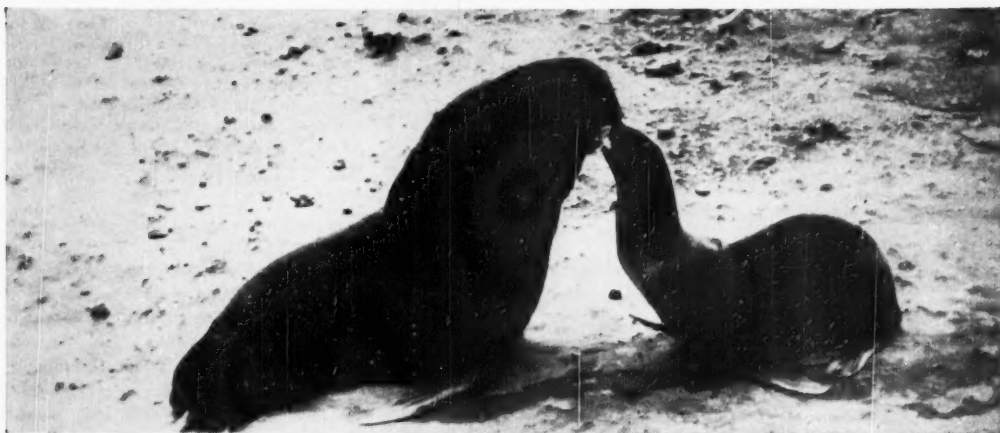
GOOD news comes, as we go to press, with respect to Glacier View Dam threat to Glacier National Park and 20,000 acres of winter wildlife refuge and wilderness in that Park. Both the Secretary of the Army and the Secretary of the Interior have agreed to elimination of the Glacier View project from the overall plans for the development of the Columbia River Basin. Conservationists presented a united front on this issue, and all agencies were responsive.

LAST year a bill proposing to increase the so-called “duck stamp” from one to two dollars in price failed of final enactment. This was due, at least partly, to the fact that tacked onto it was a provision permitting opening up to public shooting inviolate wildlife sanctuaries, purchased with earlier duck stamp money. Many conservationists could not stomach this betrayal of trust. Again the proposal is before the Congress, this time with the sanctuary matter covered with some semantic legerdemain. Propaganda in support of this measure—S.1076—is now vehemently urging the importance of more duck stamp money to provide funds for law enforcement and for checking poaching and illegal market shooting. This propaganda zealously ignores the public shooting “rider,” which now appears under the mantle of wildlife management. Better enforcement certainly is important, and funds are needed for the purpose, but we think that the proposal to break down the sanctuary status is vicious, and the more devious it is the more vicious.

R. W. W.



A seal family scene on the barren, volcanic rocks of the Pribilof Islands. Here is a gathering of fathers, mothers and pups, some of the three million fur seals that annually come to the rocks for birthing and breeding.



Seal of affection, so to speak. At least a bull seal seems to be assuring a sleek female of his undying affection, even though she may have some fifty rival ladies in the same beach household.

Disney Finds the Fur Seals— and Wins another “Oscar”

By HERMAN QUICK

SINCE the true life story of Alaska's fur seal islands invariably evokes the fantastic, it is logical that Walt Disney—acknowledged master of fantasy—should choose these volcanic bits of land, together with their incredible inhabitants, for the subject of his first “True-Life Adventure” film. For here, tucked away in Bering Sea mists near the top of the world, is enacted a complex seasonal drama.

Shrouded in almost perpetual fogs, and lighted by the eerie glow of long Arctic days, the picturesque, boulder-strewn stage—teeming with hosts of dramatic actors—was full of theatrical possibilities. The resulting film was a wildlife masterpiece, one that brought Disney an “Oscar” for the best two-reel short subject.

Entitled “Seal Island,” Walt's initial True-Lifer is uniquely instructive and entertaining. It is, indeed, a challenge to factuality to follow. Even the Disney studios may be hard pressed to maintain the quality of this film.

This opening triumph, however, was no chance outcome. There were obstacles enough to overcome, in spite of the wonderfully photogenic seals. Disney and his staff—especially Mr. and Mrs. Al Milotte, location photographers—labored long, filming and double-checking every detail of seal life necessary to launch this Technicolor feature.

“The entire footage of seal, and neighbor animal and bird life on the Pribilof Island of St. Paul,” Walt Disney explains, “is motion picture camera film made directly from the animals in the natural state and be-

havior. The only cartoon animation in the picture is a brief section of map to show the seal migration through the Pacific Ocean and the Bering Sea. This makes for better understanding of the herd life during the period ashore. It is an organized and extended candid camera visit on and about the island, designed to please general audiences, as well as those especially interested in Nature. Frankly, we at the studios are enormously pleased with current audience reactions to our off-the-beaten-path wildlife spectacle.”

“Seal Island,” Walt insists, “allows no monkeying with Nature; no humorous anthropomorphic indulgences, either in content or treatment. Mickey and Donald are taking care of that in our regular fantasy department. The purpose of the ‘True-Lifers’ in theater entertainment is to show wildlife—whenever animal life is the subject—in its natural state, undirected, unrehearsed, completely objective. Our cameras are now roaming the world for suitable subjects, both animal and human. To meet the picture requirements of our editorial policy, the only gilding of the lily that we are permitting ourselves—if you care to call it that—will consist of editing the natural footage so as to pack the material into a three-reel format that runs along in sequence, and with a sense of suspense and climatic action. The Alaska fur seals, I may add, slid into this pattern without a struggle. They're Nature's own actors, you know. And the same applies to our second short feature about the life of the beaver, which we've tentatively called ‘An Adven-



When seal mothers periodically go to sea for food, the big fathers, who can neither eat nor sleep for long weeks of jealous vigil, have to act as baby sitters for many scuttling and adventurous youngsters. Here one bull keeps a pup under control by clamping down on the youngster's flipper.

perilously close to turning the islands into extermination charnels. While the fur seals were being wastefully exploited, their companion, the sea otter, soon suffered almost complete local annihilation. The walrus, being less valuable, lingered for many years. This record should not be forgotten.

Knowing the grim commercial aspects of past and present sealing, one may possibly wonder if Disney—admittedly as timid as the proverbial hare—recorded these macabre details in *Sea Island*. If you give the matter a second thought, however, you will know the answer to this question long before you see the film: *Walt forbade the use of all objectionable features of seal life and commercial exploitation!*

Mr. Disney, like all civilized mortals, does not care to dwell on any creature's misfortunes, unless they are comic animations made of celluloid, paint, and

ture in Nature.

"The Fish and Wildlife Service, and other governmental agencies operating in the Pribilofs, gave us every assistance in filming and correctly documenting *Seal Island*. And they have, incidentally, done a magnificent job of helping to restore the once depleted rookeries. Without their present and past work, our film would have been impossible.

"Although the narration in *Seal Island* is based upon careful research, it does, to a slight extent, playfully compare some of the seal behavior to human antics; but this is not done with any sense of distortion of the animal activities. Whatever parallel is implied merely notes the resemblance of all vertebrates in their basic concerns with food and sex and survival.

"Naturally, the motion picture shots of the seals in their summer home have to do largely with birthing and the development of the young. It is the story of a place where 3,000,000 seals congregate to perpetuate their species. It is a show of Nature's patient and persistent, and occasionally feverish, efforts to conserve and multiply her creations."

At this point, Walt's outline recalls other feverish efforts that once impinged upon the Pribilof seals—the desperate, shortsighted, and insatiably greedy efforts of the sealers of several nations. They came

fancy. Real animal tragedies (commercial or otherwise) are still not a Disney specialty, the True-Life Adventures notwithstanding.

When questioned about the taking of seal skins, Walt was deliberate: "Mr. Quick, your *Nature Magazine* readers must know that our picture completely eliminates all phases of sealing that involve the killing of animals, and the handling and marketing of seal furs. Such scenes are in no way appropriate for general theater audiences. This point—let me insist—must be made perfectly clear!"

So here it is, folks.

Whether it be happy photographic exploitation (Walt's style) or hideous exploitation (poaching, pelagic sealing, and even legitimate shore killing), the unvarying life cycle of the seals invites those so inclined to use them. Fur seals are not the brightest of animals, admittedly. They cannot, in fact, distinguish between Disney's harmlessly curious camera and a skull-crushing club. So, accordingly, their regular habits make them extremely vulnerable. Both ashore and at sea, the Pribilof seals will always need protection.

Unlike most wild mammals, the fur seals employ little cunning against man; rather they show—with a kind of Shmoo-like generosity—a cooperative spirit.

in the business of acquiring their skins. (But Mr. Disney still prefers to see the animals with their coats on!) Young male seals, rejected from doomed herds at killing time, will frequently attempt to remain with their brothers in preference to escape to sea. One can well imagine the merriment this gregarious instinct evoked among the early sealers!

Soon after the purchase of Alaska, the United States realized that too little was known of its resources, and especially of the fur seal. So the Secretary of the Treasury, encouraged by Secretary Baird of the Smithsonian, sent Henry W. Elliott to the Pribilofs to study seals. Here he remained from the early summer of 1872 to the late summer of 1874. His report, published soon after his return, gave the results of this very careful study. Later, there appeared several reports that embody the same information, brought more nearly to date.

Beginning in 1870, the privilege of killing seals was leased to the Alaska Commercial Company for a term of twenty years, and on its expiration, another lease, also for twenty years, was given the North American Commercial Company. Before this latter term expired, it became evident that killing at sea, a practice doubly destructive, was depleting the herd, and the leasing system was then abandoned. In 1891 a joint

commission had studied the matter. Its American members were C. Hart Merriam and T. C. Mendenhall, and, for Great Britain, G. S. Baden-Powell and G. M. Dawson.

Another joint commission, including staffs of outstanding scientists of Great Britain and the United States, studied the fur seals in 1896 and 1897. Other investigations by the United States followed in 1898, 1899, 1900, 1906, 1909, 1912, 1913, and 1914. These studies brought out most of the important facts now known.

By 1910 it had become evident to all parties interested in preserving the seals that pelagic sealing must be outlawed, and in 1911 a treaty became effective between the United States, Great Britain, Russia and Japan. The United States and Russia, owners and guardians of the two principal herds, agreed to pay to Great Britain and Japan, for their relinquishment of pelagic sealing, a percentage—fifteen percent to each—of the product of land sealing of their herds. In return, Japan promised to pay to each of the other contracting parties ten percent of the catch from her small but growing herd. This treaty was abrogated by Japan in 1941, after two periods of fifteen years, with the suggestion that she was open to further negotiations. Here the matter rests pending new understanding.

Vista of the teeming strand of the Pribilof Islands. Larger, darker masses are the big bulls, surrounded by their harems of females and squirming young. Seal mothers bear a single pup each season. Ten to one hundred females may be in each harem. Bachelors live in companies apart.



Under treaty specifications, administered by the United States, the fur seals have flourished. No longer were sailing schooners permitted to scour the seas between Oregon and the Pribilofs, their crews killing all hapless animals that broke surface within range of their omnipresent canoe crews. No longer would sleek little mothers—each heavy with an unborn “pup” on the northward swim—sink to the ocean floor before brutal hands could grasp the limp, slippery bodies. Civilized treatment, unbelievably delayed, has finally come to another of Nature's sorely driven creatures.

Now, with a yearly increase of animals varying from seven to ten per cent, gigantic herds seasonally frequent the Pribilofs. The 1947 herd census reports them as numbering 3,613,653 individuals. For advocates of systematic and prolonged conservation, here is a victory worthy of repeated telling.

Until Japan withdrew from the pact in 1941, all four nations pledged to protect the seal resources equally benefited from our government's administration of the herds. A few statistics vividly tell the extent of their profits.

Between 1911 and 1942 the successful upbuilding of the rookeries permitted the taking of approximately 895,000 “surplus” animals. With only 3191 skins permitted in 1912, recent figures are more impressive. In 1940, 65,263 skins were taken; the following year, 95,013. In 1942 sealing operations were greatly reduced because of war restrictions, but 1943 proved a bumper crop year, with 117,000 skins allowed. In 1947 the fur harvest continued to remain at a satisfactory high level, when 61,447 three-year-old male seals—the “bachelors”—were harvested.

The unfortunate bachelors are selected carefully. If they are too young, their skins are not large enough; if too old, their fur is too coarse. One healthy specimen must be rejected from the herds for every forty females of their own age. When this has been done, government agents drive the doomed bachelors inland to the more convenient killing grounds. Here each bachelor is quickly dispatched with a swift blow on the head. Its skin is then removed, salted down with the season's crop, and sent to St. Louis. Later it will be sold at public auction, bringing possibly \$40 or \$50 dollars. From six to eight skins will be required to make the average sealskin coat. To this end most of the bachelors are destined.

Various adventures—and disasters—await the few bachelors that are rejected at round-up time. On the long swims to follow during the next three years, killer whales (the fur seals' worst natural enemy) will claim many, together with enormous quantities of young pups and their mothers, the “cows.” Even the fully matured, 500-pound males—the harem “bulls”—are little more than tidbits for these voracious whales. Still other bachelors will perish from wounds received in battles with the possessive bulls, or in fights with their own harem-seeking companions. Those that sur-

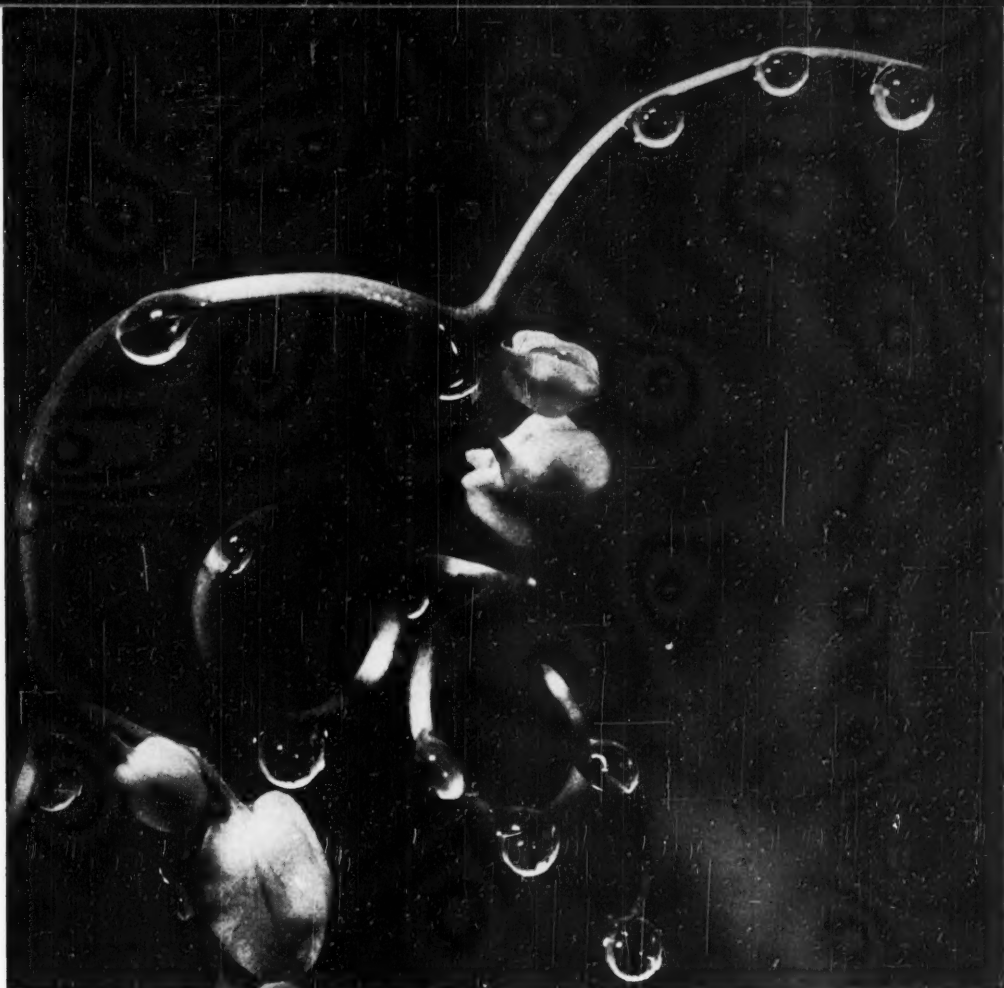
vive these many perils will, at about seven years of age, become burly harem masters themselves. Then, surrounded on their rocky beach stations by their browbeaten wives, they will spend their Pribilof seasons belligerently protecting and lustily increasing their property. For three months they will dominate their stations, living without food, seldom drinking or sleeping! Some bulls will remain wife-poor during this time, being able to master only five or ten of the fickle females. Others will acquire (often for no apparent reason) as many as a hundred wives, and occasionally more.

Weighing about eighty pounds, the pretty, silver-furred females must accept the domestic regime dictated by their jealous mates. They arrive at the islands during the first weeks of June, where they are met at the waterfront, so to speak, by the bulls, which preceded them in May. The bulls, strong, vain and possessive, have selected their positions, and each cow, as she arrives, makes her own choice of a mate, by whom she will be closely guarded and kindly treated, unless she seeks to desert the chosen home.

Miraculously timing her arrival, the cow that has been mated the previous season will give birth to a 12-pound pup, sometimes within a few hours. She will indifferently suckle her coal-black baby. Within a few days the mother, now free to leave the rookery, will take the first of a long series of feeding trips to sea. Each of these may consume several days, for she may cover hundreds of miles. She gorges herself on squid, herring and various other small fish, and after each full meal she remains until digestion enables her to replenish her supply of milk. Upon her return to the rookery, she will seek out her own pup from the others and suckle it. Should she fail to return, however, the pup will die of starvation unless it is adopted by some mother that has lost her own pup. The mothers, indeed, are so kept at the task of reproducing that they seem to resent their continuous maternal responsibilities.

Generally well nourished, the pups spend most of their time sleeping, wandering about the beaches, or preventing their oblivious stepfathers from stepping on them! Much of their time is also spent playing with their companions, or in learning to swim and catch small fish. By late August they are expert swimmers in the roughest of water, and by November they will be sufficiently strong to swim southward with the older animals. Once the herd bids adieu to the islands, moreover, all of the animals—pups, bachelors, debutantes, cows, and bulls—must remain at sea continuously until the next year. This is no problem, we must add, for the fur seals are more at home on water than anywhere else. The Pribilofs have only one basic function—to provide a place suitable for reproducing the species; a nursery that is cool, moist, and well drained. The seals will have none other.

All the facts of the southward migration, as yet, are not complete. The labor (Continued on page 292)



PHOTOGRAPH BY HARRY PEDERSON

"Dew is one of the most beautiful and most mysterious of all the earth's phenomena."

Dew: Nature's Miracle

By JOHN W. WHITE

MAN of the harassed Atomic Age might soothe his soul by pondering the nightly miracle that produces the gentle dew, as the poets call it. For dew is the by-product of a process of checks and balances with which Nature has prevented the destruction of the earth by a catastrophe far worse than a million atomic bombs.

Physicists say that if the immense quantities of heat that are radiated to the earth's surface by the sun had been allowed to accumulate, the earth would have been destroyed long ago. The disaster has been averted because, as the earth revolves away from the sun, it cools off during the night by radiating much of its heat back to the cold and empty heavens. This

cooling-down process produces dew—one of Nature's greatest blessings to man.

Dew is one of the most beautiful and most mysterious of all the earth's phenomena. It provides much of the beauty of an early morning walk, when all plant-life is sparkling with dewdrops. It covers the rose petals with diamonds and fills the lily cups with nectar, for which the bees busily contend as soon as the sun rises.

Many rose culturists insist that moonlight is essential to the raising of beautiful blooms. It is the dew, however, not the moonlight, that increases the fragrance of flowers and refreshes all growing things. Dew forms, however, only when the sky is clear, so

roses and other flowers show its refreshing effects on mornings after clear, moonlit nights.

The importance of dew goes far beyond the esthetic, of course, and there are several places in the world where this moisture of the night is an essential factor in the national economy. In some hot countries, the dew is sufficient to take the place of rain, which is scarce. Without the dew, plant-life in these regions would die.

In tropical areas the dew is sometimes so heavy that it can be collected in gutters. Yet, meteorologists have done little toward measuring the dew supply, and there are practically no data on the subject. It has been determined, however, that at London, and at Tenbury, in Worcestershire, there is an annual "fall" of between one inch and an inch and one-half, compared with the annual rainfall of 35 inches.

The dew miracle begins shortly after sunset on clear, cool nights and continues until sunrise, unless clouds appear, whereupon the process ceases. As the earth and plant-life, and other outdoor objects, radiate their heat and get cooler, moisture is condensed on them from the surrounding warmer atmosphere. This moisture is the dew, about which poets have sung since the days of Cicero and Virgil.

Aristotle was one of the first to observe that dew appears only on calm, serene nights. He supposed that it fell like rain, and poets still sing of the falling of the dew.

The moisture that appears on a glass pitcher containing iced water disproves the theory that dew falls, since it is formed by the same principle. The analogy is so perfect that the cool container method is used by scientists for determining the dew-point—the level to which the temperature must be reduced to form dew under various atmospheric conditions. This dew-point is a highly important factor in hygrometry, where it is used to measure the pressure and amount of humidity in the atmosphere.

The things the dew does, and does not do, are striking. It thickly covers every leaf and blade that requires moisture for life, yet seems instinctively to avoid forming on dust, rocks, pebbles, or other barren formations that would not be benefited. It does not appear in cold, damp climates where the air is saturated with moisture. In covering tender plant shoots with moisture it shelters them from the cold that is forming the dew.

In this connection, Herodotus made the amusing observation that, in Egypt, the crocodile passes most of the day on land, but spends the whole night in the Nile, because the river is warmer than the atmosphere and the dew.

Dew provides the answer to the question of why clear, cool nights are followed by misty, foggy mornings. The dew becomes mist and fog when the sun

risers and begins to warm the earth, causing the cool moisture to rise into the atmosphere again.

On those nights when the temperature falls below 32 degrees Fahrenheit the dew freezes and we have hoarfrost, with its beautifully designed crystals.

Dewdrops themselves are things of almost incredible beauty. They form in surprisingly symmetrical fashion on leaves, on blades of grass, on spider webs. The most beautiful patterns appear on leaves that are covered with fine, hairy down, such as those of strawberry, blackberry, and clover.

One of the many dew mysteries is why it does not form on blades of grass that are broken. It may be because grass radiates its heat through the point of the blade, and because the dew forms only at the point of radiation. At any rate, dew forms only on the blade's point and when the point is broken off there is no dew. The tiny, diamond-like drop of dew grows until it becomes too heavy to retain its precarious position on the pin-point of the blade. Then it rolls toward the root of the blade, breaking into tiny drops as it slides. This process is repeated until the grass blade is covered with dewdrops. Strangely enough, they are almost all of identical size. The size of dewdrops varies greatly from one object to another, but those on any given object usually are of uniform size.

Every dewdrop, wherever it may be, is a tiny mirror that reflects, upside down, whatever is within its



range. Look into a dewdrop and there see a minute picture of a piece of sky, the corner of a cloud, or two or three pygmy trees or bushes, or the full moon in all its glory. Surely the night offers few spectacles that can compete with a spider web that is jewelled with hundreds of dewdrop diamonds, each one holding within itself the reflection of the full moon.

One of the many strange facts about dew is that it refreshes and brightens all living plant-life, and, at the same time, speeds up the decay of dead tissue, whether plant or animal. Both Pliny and Plutarch affirmed, and the people of the West Indies still

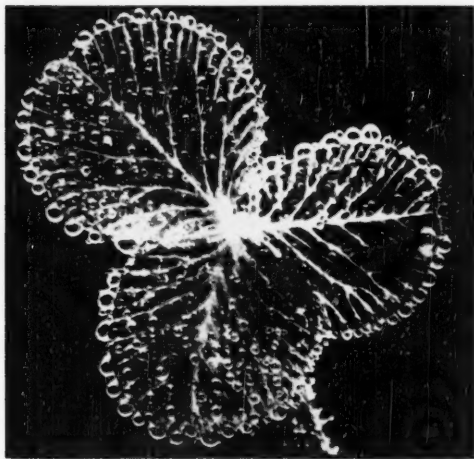
believe, that human and animal corpses decay faster when exposed to moonlight than otherwise. Since there is no heat in the moonbeams that reach the earth, they have no effect on dead animal tissue. It is the dew, not the moonlight, that hastens dissolution. The confusion arises from the fact that dew is heaviest on clear moonlit nights.

This rotting effect of dew on dead tissue is utilized in the preparation of flax and hemp, and is described in the word *dewret*—to rot or rot by exposure to dew and the sun. This process facilitates the extraction of the fibers from the surrounding vegetable matter without breaking them.

The word *dew* is one of the oldest in our language, having come down from *deaw* of the old Anglo-Saxon. The English language has built more than two dozen word combinations on *dew*, and practically every one of them testifies to the beauty and effectiveness of English. Let those who espouse the romance languages as being more expressive than English come forward with just one word combination in their favorite idiom that is as provoking of beautiful

At the left, dew bejewels the strands of a spider's web and, below, outlines in scintillant drops the clover leaf, while, at the right, it bends a grass stem with the weight of its heavy, shimmering pendants.

AMERICAN MUSEUM OF NATURAL HISTORY PHOTOGRAPHS



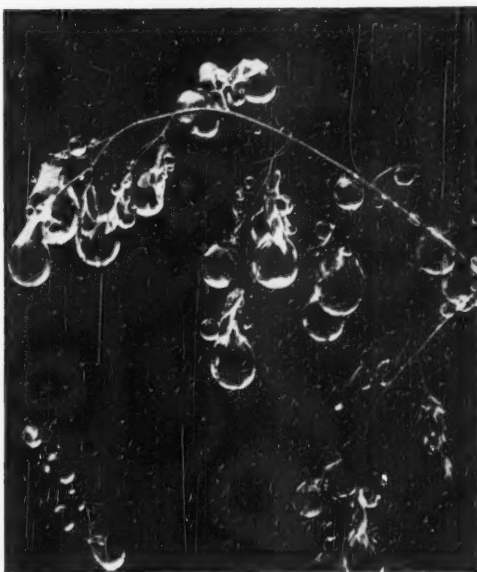
thought as these English combinations on *dew*, such as dew-bright, dew-gemmed, dew-bediamonded, dew-spangled, and, even, dew-lipped.

Less beautiful perhaps, but no less meaningful, are dewbeam, a ray of light reflected from dew; dew-bolne, a swollen condition of animals from eating too much damp grass; and (in England) dew bit, a snack before breakfast.

In the plant world we have dewberries, dewdrops, dewflowers, dewgrass, dew leaves, dewtry and dew-plant. In our own world, what swain has not thought

of his sweetheart as dewy-eyed? There is a whole school of sentimental literature and poetry published under titles built on the word dew or dewdrop.

Scientists have been fully as interested in dew as have the poets, since time immemorial. It was not until the turn of the Nineteenth Century, however, that a really scientific work on dew was produced. The celebrated classic on the subject is the "Essay on Dew," by Dr. William Charles Wells, first published in 1814. Dr. Wells was physician to St. Thomas's Hospital in London, and was the first investigator to



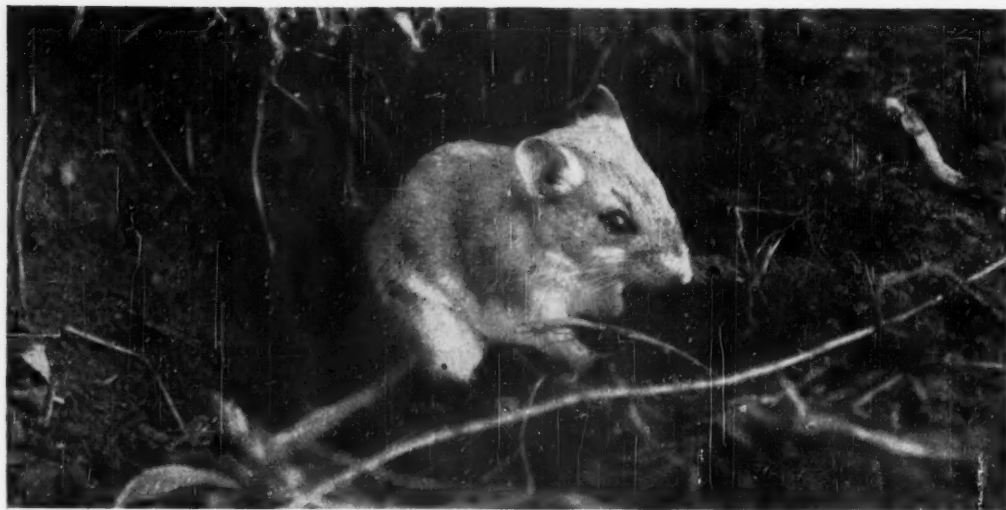
prove that dew is condensed, instead of falling. The "Essay" is a report on the long series of experiments he began in 1784, and it is not only of great scientific importance but also a model of literary beauty.

Thomas Jefferson also experimented with dew, and reported in his "Notes on Virginia" that dew is much less copious on hills than on plains, an observation that had already been made by both Aristotle and Plutarch. The reason is that the cooling of the air is greater on the plains than on the hills.

A notable exception to this rule is Mount Hermon, in Galilee. Perhaps no other mountain is so generously drenched with dew as Hermon. The dew, in fact, is Hermon's life; it waters and refreshes every living tree and plant upon the mountain. As in other parts of the world, the dew on Mt. Hermon does not form on the pebbles and dust, or on dead shubbery; only where there is life requiring moisture.

The "falling" of the dew on Mt. Hermon was so famous in Biblical times that it is referred to figuratively in the 133rd Psalm as the emblem of the descending of the Holy Spirit.

As far back as man's (Continued on page 292)



The plains grasshopper mouse is a large, nocturnal mouse with velvety fur, large eyes and ears, and a prolonged, needle-like squeak so high-pitched that it is inaudible to most human ears.

Grasshopper Mice

By H. H. PITTMAN

Photograph © by the Author

GRASSHOPPER mice are probably the least known of all our northern mammals. For some time this claim to distinction seemed to belong to the wolverenes, for only trappers came in contact with them. Recently, however, so much has been written, pro and con, about these woodland raiders that their name at least is familiar to everyone. Some of the smaller mammals are particularly interesting, but as most travelers are seeking only for game or fur-bearing animals they are generally overlooked. There is some excuse for neglecting the grasshopper mice, for they are nocturnal and shy. Thousands of people live in districts where they occur without even being aware of their presence.

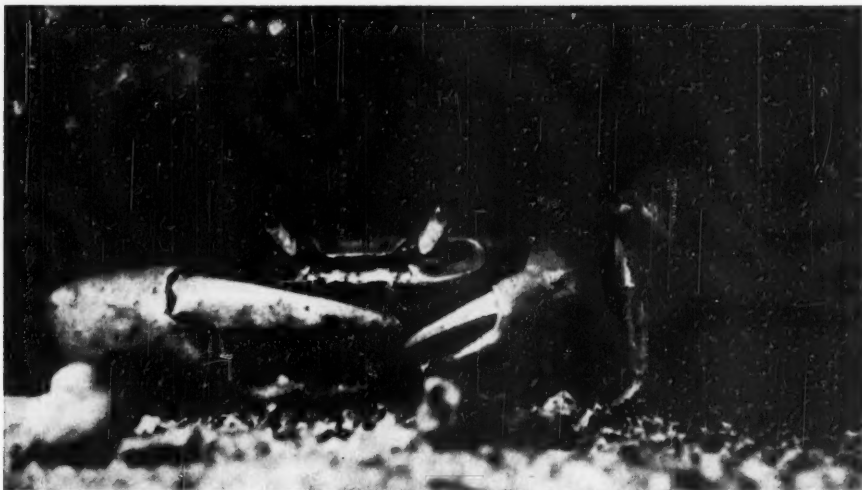
These large mice impress an observer as being really desert animals, and they seem to like light sandy soil. I have found them on thinly grassed spots along the Souris River in Manitoba, and also in parts of southeastern Saskatchewan. It is difficult to estimate their numbers, but I doubt that they are numerous in either of these districts.

Although lithe and active, these large mice are heavily built. Their robust, sturdy appearance is accentuated by their comparatively short, thick tails. In Saskatchewan the one generally found is the Maximilian grasshopper mouse, *Onychomys leucogaster leucogaster*, whose velvet-like fur is buffy-brown on the back and pure white below. Dead ones bear a

superficial resemblance to young rats, and, as most specimens are accidentally caught in traps set for ground-squirrels, they are usually discarded as uninteresting. The eyes and ears are large, and there is an air of delicacy about them that is totally lacking in rats of any age. However, since people who have trapped scores of them would unhesitatingly declare they had never seen a grasshopper mouse, we may regard them as the mystery mice of the prairie.

As their large eyes suggest, grasshopper mice are strictly nocturnal, and are generally met with in the dusk of the evening. I have occasionally seen them in the daytime but have never found one in the sunlight. Often the first indication of their presence is a prolonged, needle-thin whistle, but this is so high-pitched as to be inaudible to many human ears. Frequently an intruder upon their domains is unprepared when he hears it, and, after listening in vain for it to be repeated, decides it was just a trick of the imagination.

This strange un-mouselike call must terrify small animals within hearing distance, for grasshopper mice are flesh-eaters. They readily kill and eat other mice, as well as small birds when they can catch them. While we assume that their normal diet consists of various seeds and small fruits, their liking for grasshoppers, crickets and many other insects is noticeable wherever they are (Continued on page 292)



The land crab took refuge under a barnacle-encrusted rock, watchful, with eyes raised on their stalks, pinchers folded in front of mouth-parts and poised for a fast take-off.

The Ways of a Land Crab

By RICHARD F. TRUMP

THEY reminded me of woodchucks, even with a half dozen too many legs. That is why I started stalking land crabs on the Isthmus of Panama, notebook in hip pocket.

Awaiting my ship at the naval base, I had time to wonder what was happening to the woodchucks back in Iowa. Some were carrying my numbered tags on their ears, wasting their wanderings because there was no one to record their travels.

So it seemed natural, when I saw a crab dash madly for its burrow, stop abruptly at the entrance and wait to see if the menace was real, or a crab stalk from its burrow toward a patch of grass, stopping at intervals to test its safety, that I should think of woodchucks.

Watching the crabs, I was puzzled by the same questions that prompted my tagging those Iowa 'chucks. What do they eat? When do they eat it? Do they have one burrow apiece or many? Do they use each other's burrows in time of danger? Will they allow



A spring-type clothes-pin is admirable as an instrument for handling land crabs.

"strangers" near their burrows at all? How far do they go from "home"? If taken farther away, will they find their way back?

So I tied a black thread to a stone; fixed it so a slight jerk would roll the stone over the burrow entrance. Awaiting the tenant, I explored, returning, a half-hour later, to find the thread neatly snipped near the mouth of the burrow. Tying the severed ends, I looped the thread away from the entrance and waited at the other end, behind a coconut palm. Ten minutes later the crab's head appeared; poised for a bit. Then the animal came out and turned directly toward the thread, reached out with a claw, pulled the thread to its mouth, I hesitated a few seconds, then pulled gently. The line was clipped!

Before leaving for supper I put four short lengths of thread at the entrances of other burrows. Returning at dusk, I found each of them had been cut in one or more places. One piece had been dragged partly into the hole, and the



There was usually a circular area, up to several yards in diameter, where the crabs had clipped the grass from about their burrows.

at times, watch them in plain view from close range, but the slightest movement sent them scuttling sideways until they had hooked one set of legs over the edge of their burrows. Once in that safety zone, they are much braver animals.

Like many of their relatives, these crabs are incredibly fast. I have stood only three feet from a burrow and waited till a crab came out and advanced an equal distance in the opposite direction from the entrance; then, with a sudden movement of my foot, I have tried to block the entrance. But the crab was there first. One reason for the quick take-off is that they advance sideways. To reverse

severed end was still moist with the crab's saliva.

Conclusion for the day—Panamanian land crabs cut black threads.

A couple of days later I placed a strand of dried grass near a hole. When the crab emerged, it promptly nipped the grass in two, then ate about five inches of one of the pieces, holding it in its mouth as a boy would a stick of candy, pushing it gradually forward with its claws. The other piece it carried underground.

Subsequently I saw crabs carry immature coconuts, leaves and flowers of the breadfruit tree, and a variety of grasses, into their holes. When I blocked the entrance of a burrow with breadfruit, the crab stayed inside for a day. Removing the barrier, I found that the crab had been feasting from below. When I tossed a banana peel near a crab, it flinched slightly, then quickly advanced and dragged the peel to its burrow. One day, when a number of large crabs were outside their holes in a thickly populated plot, I threw a ping-pong ball among them. Two raced for the prize, and the winner pulled it against his body with its great chelipeds and started for his lair. Before reaching it, however, he paused a moment, then dropped the ball. I suspect that these crabs, like many other crustaceans, are versatile feeders.

A large coconut, rolled over the ground, frightened the crabs into their holes; objects smaller than a baseball usually attracted them. They were not afraid of noises—if "noises" exist for them. Nor could I frighten them, while hidden, by stamping sharply on the ground at a distance of thirty feet. I could,

Braced against a coconut palm, the land crab was ready to use that big right claw, which was inadvertently cut short in the camera's viewfinder.

their direction, then, they do not have to turn around but merely start running!

To catch a crab, I looped a noose of thread around a burrow opening and stood back ready to jerk. Once when the thread broke near my hand, the noosed victim scuttled into his burrow. Each time I pulled gently on the thread, he retreated deeper. When this stopped, I tied a knot at the entrance and waited for the crab to untangle himself. He had retreated thirty-two inches. Several inches of the thread were wet, substantiating other evidence that the burrows extend well below the water line.

The first specimen to fall to my noose I immediately released at a point nine feet from its burrow. The crab started directly away from its hole, rested under a low shrub; started back a few feet; then, with much back-tracking that seemed aimless, it traveled about twelve times the necessary distance before it finally reached its burrow. The entrance had been



closed by a small clod and the crab circled cautiously before squeezing under it to safety.

Many of my questions could be answered only by marking the crabs as individuals. The next two specimens that reached for my noose were of similar size but from holes 58 yards apart. Marking them with distinctive spots of white ink, I released them at the opposite holes. One was apparently satisfied, for it was still using the burrow a month later. But the other was never seen after it entered the hole, and I suspect it moved to other quarters during my absence.

Using a durable and fast-drying stencil ink, I marked the crabs with conspicuous white numbers on the carapace. They looked like crustacean athletes.

In this experimenting I learned that the most valuable implements for one who would handle live crabs are a couple of spring clothespins. Letting the crab grip the pin, I then let the pin take a firm grip on the claw. One might expect a crab in such a fix to part with his chelipeds. This happened a couple of times when I was carrying specimens by the pins. One of my notes says: "After 15 minutes the lost claw was still gripping the pin tightly, and when I pulled it open, it clamped down on the wood again with considerable force."

Later I noted: "When I was handling number 132 he autotomized his large left claw, escaping temporarily. Cornering him among some rocks, I noticed that he struck out defensively with his first left walking leg, along with his right cheliped. The action, though not really effective, was very similar to the previous action of the claw which he had lost."

In the meantime other crabs were turned loose away from their homes. A medium-sized male, deposited about eighty feet down the shore line, started back, but having gone about fifty feet he entered a vacant burrow, which then became his permanent headquarters. A small male, released thirty feet from his burrow, was back at home next day. A medium-sized female also returned from a point twenty-five feet from "home."

More interesting, and probably more significant than an individual crab's ability or tendency to return to its own burrow, is the whole question of what the word "home" means when applied to *Cardisoma guanhumi*. I wondered whether a burrow is an individual "possession," whether it is defended from

intruders, and just how permanent a residence it is.

It was soon evident that, when frightened, crabs sometimes take refuge in the wrong burrow. On a couple of occasions they were promptly chased out, although, when I approached, both crabs would return to the burrow and manage to remain peaceful in the face of danger. Occasionally I captured a crab that had inadvisedly tried to enter too small a burrow. And once I observed a strange deadlock when a crab dodged into a hole as I approached; within a few seconds it reappeared, and I saw a large claw of another crab blocking the entrance. When I backed away, the intruder came farther from the entrance, but when I stepped forward it quickly returned to

face its inhospitable neighbor. I retreated and advanced several times with the same results. Finally, however, both crabs disappeared deeper into the burrow, and I was unable to wait longer.

Some sort of dominance was evident as I spied from behind a button-mangrove. "A large crab came from B2, advanced toward B1 where a slightly smaller specimen was at the entrance," I noted. "Frightened when I slapped a mosquito, the B2 crab returned to the mouth of its hole. The one at B1, which apparently had not been disturbed by my movement, followed slowly toward its neighbor's burrow. When it was within a few inches from B1, the larger crab charged out of the entrance, and the smaller one fled speedily into its own burrow. The larger

one followed and remained on the pile of wet soil outside B2 for a moment before returning home. . . . It seems notable that this individual chased another from its burrow even though it had just been frightened by my movement."

Two specimens that I had marked took refuge in burrows occupied by animals somewhat smaller than themselves. By next morning both had left their emergency quarters. I assume that they were either not inclined—or were not able—to rout the smaller tenants. One of these marked crabs returned to its own burrow, seven feet away; the other was not seen again.

Number 133 was a large male, with an enormous right claw, and was smeared with black oil. I released him at S7, the home of a rather light-colored specimen nearly as large. Crawling toward the entrance, big claw forward, he turned (Continued on page 288)



Baffled when a small coconut was rolled into the mouth of its burrow, this small specimen stands his ground, ready to fight.

Fragrant Buttonbush

By WALTER S. CHANSLER

WHEN traveling over marshy ground during the middle or latter part of summer, one will often become aware of a peculiar, delicate fragrance permeating the atmosphere. More than likely, this will be found to be coming from hundreds of little, creamy-white flower-balls that dangle on long stems from the drooping branches of low, roundish bushes. One will do well to stop and examine these little, fragrant "cushions full of pins," for one is in the midst of a growth of buttonbushes, the flowers of which are "wasting" their fragrance on the swamp air.

Growing with its feet in the muck and mire of marshes, often drooping its oval-leaved branches above the shallow swamp water, the buttonbush, *Cephalanthus occidentalis*, is one of the most common of our water-loving bushes. Its fragrant, globular blossoms are a great delight to the bees and butterflies, which love to hover about them to partake of the sweetness found deep in their nectar wells. Its drooping branches afford shelter for many kinds of small birds, and cast dense shadows on the shallow



waters, where muskrats and small fishes find a safe retreat from lurking enemies.

The buttonbush has a wide distribution, being found from New Brunswick southward to Florida, and westward to Arizona and California. Just why it has not been more widely planted as an ornamental shrub for gardens and lawns is something of a mystery, since it is more attractive in every way than many of our cultivated shrubs. It will grow readily in most any partly shaded and somewhat sheltered spot. And although it is a water-loving shrub, it will thrive in almost any moist location. Its flowering season is quite extended—from June to September.



The Butterflies Are Here Again

By SAMUEL A. HARPER

The butterflies are here again,
Now that the birds are still.
They seem quite aimless in their flight
Without design or will.

In shady groves they softly fall
Like pirouetting leaves,
Until they almost meet the ground,
And will, one now believes.

When suddenly but softly still,
They catch the air and sun
And rise again among the trees
As they have always done.

And now I see two butterflies
Meet on the airy trail;
They pause and flutter as they dip
A light and generous hail.

And wonder fills me as I rest
Outstretched upon the ground,
When one floats down and speaks to me,
Not uttering a sound.

And while this blossom of the sun
Seems guided by no plan,
I wonder if he tries to guess
What is the aim of man.



Arapaho Glacier, Colorado's largest, supplies the city of Boulder with water. The glacier is about a mile long and nearly a mile wide, and estimated to be five hundred feet thick.

Boulder's Private Glacier

By CHARLOTTE HILTON GREEN

Photographs from Boulder Chamber of Commerce

TODAY many cities of the world are facing a critical water supply problem. Not so, Boulder, Colorado. This city, nestling at the foot of the Rockies, taps the pure, cold water of its private glacier, the Arapaho. Snug against the Continental Divide, it is the largest of several glaciers in Colorado.

Boulder is said to be the only city in America, perhaps in the world, that owns exclusive rights to a living glacier. In 1919, Congress authorized sale to the city of 3965 acres from the Roosevelt National Forest. This included Arapaho Glacier.

The city is proud of its glacier and conscious of its opportunity, as well as its responsibility, toward this unique water supply. So, for the past ten years, the Boulder Chamber of Commerce has sponsored an all-day hike to the glacier. Conservation-minded, this city, seat of the famed University of Colorado, wants its people and its visitors to know something of its glacier, the beauty of its surroundings, its purity, its never-failing supply. The volume of water stored from this source is figured at 3920 acre-feet. An acre-foot is one foot of water over an acre.

Arapaho Glacier is twenty-eight miles from Boulder. Its water is piped direct from glacial lakes to

the city reservoir. Clean, cold and sparkling, this water needs no filtering or chemical treatment, although it is tested weekly for any impurities.

During the past ten years, three thousand people, from many parts of our own country, and even from some foreign lands, have climbed to the Arapaho on this special pilgrimage. They have learned, first hand, something of conservation, of the ever-growing importance of a city's water supply, the care of its watersheds, and of the thrill of mountain climbing.

The glacier pilgrimage is held early each August, usually on Sunday, when summer school students and workday people are free to go, as well as the visiting vacationists. Registration at the Chamber of Commerce office is two dollars, including guide service, a hot breakfast at the Base Camp, and a hot dinner at the return to the camp in the late afternoon. Hikers are advised to carry a light lunch to eat at the glacier.

Each person must arrange for his own transportation to the Base Camp at Fourth of July Gulch, twenty-eight miles by car. Last summer I made the trip with the Ralph Haldermans, who were also going for the first time, and as a family. Many family groups go, which is important in this age, when there seem



The trail to the glacier leads through slopes carpeted with flowers. Gradually the trees become fewer as the climbers approach the line of timber.

to be so few activities a family enjoys together.

"Glacier Day" in Boulder is always a long and strenuous one. It begins before five in the morning, when all cars meet at a given point. Some of the sponsors and their helpers had left Boulder at two in the morning to prepare the great boilers of coffee, immense pans of scrambled eggs and bacon, cereals, toast and fruit. All are volunteers, and in 1948 Clyde Haring was chairman of committees. For many years Mrs. Mary Thoman has been the chief cook.

F. W. Retch, chamber secretary, plans the climb. Ten guides are headed by H. B. Van Valkenburg III. There is even a doctor. Although there has never been a casualty greater than blisters or skinned shins, the Chamber of Commerce is taking no chances. So for years Dr. H. H. Houston has gone along, and would not miss the annual trip for anything.

On the ascent the guides stop the trippers at frequent, although brief, intervals. To

Those who are to make the annual climb to the glacier are served a hot breakfast by members of the Boulder Chamber of Commerce and the Rocky Mountain Climbers Club. A dinner awaits after the descent.

the lowlanders especially, climbing at these high altitudes is difficult. For many, perhaps for the majority, this is their first mountain climbing. The youngsters generally take it in their stride, but the middle-aged and oldsters found it strenuous, even though the sponsors, in their enthusiasm, rather too optimistically stated that "anyone not too old or decrepit could make it with ease."

On these trips many get their first understanding and proper evaluation of the outdoors; of how all of it is a part of our life and our heritage. They learn that, in its real sense, recreation means "to re-create"—and that is what they are doing. They are garnering new ideas of the world they live in and their dependence on it—and responsibility for it. They are seeing beauty, too, from the close intimacy of the Alpine flowers at their feet to the wild, awesome but majestic beauty of distant snow-capped peaks.

Leaving Boulder, on the plains, at an elevation of 5345 feet, and climbing to the glacier, about 12,500



Far above timberline the going becomes more rugged and brief stops are made to provide time to admire the view.

feet, one passes through five life-zones. It is generally conceded that one mile of elevation is equal to from 800 to 1000 miles — northward — in latitude. From the plains we climbed through the forested slopes of the Rockies, with its varied assemblage of cone-bearing trees.

To the Easterner, the trees seen are all fascinating. At the lower elevations are great stands of ponderosa pine and Douglas fir; the colorful Colorado blue spruce along the streams; higher up the closely related Englemann's spruce; at middle elevations the lodgepole pine, so named because the Indians used the slender trunks of young trees for lodge poles. Still higher, the limber pine, with branches so "limber" that knots can be tied in them. And, higher up, the Alpine fir. In patches along the way, and on other mountain sides, conspicuous by its lighter color among the dark conifers, is the trembling aspen, one of the few hardwoods of Colorado, and one that furnishes



the chief autumnal color for the highlands of the Rockies.

And then timberline is approached, where the trees become dwarfed and distorted from the short growing season and fierce winter winds. Yet how artistic they are! And at last we pass the timberline and enter the Alpine zone with its exquisite flowers, and one might well imagine he is nearing the Arctic Circle.

We had left the plains to the song of the western meadowlark, and along the way had seen hundreds of redwings, with one yellow-headed blackbird standing out in startling contrast. We had seen a Lewis woodpecker that, to the Easterner, looks like a crow with a rosy breast; numerous red-shafted flickers, with cries that reminded us of those of his eastern, yellow-shafted cousin. A lone western tanager, a beauty in black and yellow and scarlet, and a Bullock's oriole were other avian treats. From a roadside pond four avocets took wing. We saw their flight pattern and their slender, upturned bills, heard their shrill "wheek, wheek." They dabbled in the mud, heads buried, rears to skyward, just as do the dabbling ducks! There was a mountain bluebird—azure blue above, gray-blue below—and, at last, along the rushing water of Boulder Creek, that little gray sprite of mountain waters, the teeterer on wet rocks, the water ouzel!

Long afoot, and already above timberline, we saw rosy finches, and I was thrilled by the pipits. In Carolina we know them only in winter as a not-too-common bird, always a thrilling record on the Christmas

Blue columbine is Colorado's State Flower, and great drifts of it are seen along the trail to the glacier.



bird-census—a thrill because of its relative rarity.

This was my fourth trip to the summits, and my last chance of the summer to see a white-tailed ptarmigan. I was disappointed again, but the frequent stops and resting periods in that high altitude meant an opportunity to watch the little ground squirrels, the conies, and the marmots that live in the rock slides and among the boulders. Here, far above timberline, were the dwarfed shrubs and grasses that furnish food for these hardy mountain creatures. A sharp whistle, perhaps from a sentinel guard to give warning that some queer, giant, two-legged creatures were approaching. And there, among the rocks, were the odd, tailless conies, or "rock rabbits," that look like a cross between a guinea pig and a tailless rabbit. These little "hay-makers" of the heights are strangely provident creatures, for they cut the tough grass and herbs, cure it, and store it away under rocks and roots, for winter bedding and food.

It was fascinating, as one rested, panting, to watch for one of those conys, then try to find the little "hay-pile." All about one were the tiny, dwarfed but perfectly formed Alpine flowers. For the flower and bird lover, this trip to the glacier is like something out of this world. And one must divide allegiance and attention between birds and flowers, sharing these with trees, small animals, clouds and views of distant peaks. It puts a terrific strain on one's ability to absorb.

All the way from the plains we had been "drinking in" the flowers. We saw wild geraniums, from deep rose-lavender through rose and pale pink to almost white; mariposa lilies; wild larkspur, occasionally; Colorado's State Flower, the blue columbine; veronica, penstemon. On the lower part of the foot trail, in the more open wooded sections, there were polemoniums, both the nectar cup and Jacob's ladder; blue-eyed Mary, blue sage, and silvery lupine.

There was Indian paintbrush, running the gamut of reds, from deep carmine and wine, through scarlet, rose, flesh-pink to cream-white. There were yellows of varied shades, from the tiny yellow orchids, half-concealed beneath a misty waterfall, to the golden buttercups, butter-and-eggs, bladderwort, golden borage, puccoon, primrose, wood sorrel, golden avens, shrubby cinquefoil, creamy cinquefoil, goldcup, golden banner, wall flower, sulphur flower, golden smoke.

But it is on the open summit that the Alpine flowers take over one's heart. A southerner thrills to see, growing wild and profusely here, some of the flowers

she has struggled with in a rock garden. Buffeted by cold and biting winds, or defying hot suns, are chiming bells. Home, we call an almost identical species Virginia bluebell, and along my stream it grows to two feet. Here, perfect in proportion, complete in leaf, flower and stem, they stand two inches high! There is rose crown, and, still higher up, the smaller, darker-headed king's crown. There are harebells that should adorn a fairy's bower, and fairy primroses that should share the honor; Alpine forgetmenots, clovers, buttercups, clematis and pinks. One is literally intoxicated with flowers as well as breathless from the high altitude.

Three Little Foxes

By HAZEL VERNON TYLER

Three little foxes, silverly shod,
Ran by me, going south;
The smallest one among them bore
The brush of his tail in his mouth.

The second ran sideways, and leaped at a bird;
The third did nothing at all,
But looked at me, with the sun in his eyes—
Then three went over the wall.

I was alone in the pasture land,
With memories—one, two, three—
Three little foxes, silver shod,
And one had looked at me!

The climb became difficult indeed for most of the glacier trippers. We had gone in and out of several squalls, donned raincoats and heavier wraps, pulled them off when the sun came out hot and steaming. The trail grew steeper and rougher; breathing more difficult. We had been advised to chew gum, with mouth open, to allow more air into the Eustachian tubes. I had been advised to take a cane, which helped a lot. Others, even youngsters, tried to find staffs, to use as alpenstocks, before leaving the wooded areas.

The last half-mile was indeed rugged. On the open summit the harsh winds reached gale proportions. Intermittent rains became sleet, pelting us in the face. The air was so rare most of us had to stop every few moments to rest. One girl of about thirty was huddled against a rock cairn that marked the trail. "I just can't go on," she said. "I'm from the coast and I'll have to try again when I'm more used to these altitudes."

An older woman stopped to commiserate with her. "I would, too, if I were your age. But all my life I've wanted to see a glacier, and I may never get this close again." And she struggled upwards.

At last the saddle of the glacier was reached. We sought the protection of an overhanging rock to look down upon the glacier—our goal, at last—and up at the peaks above. The older woman of the trail sat near me. "All the rest of my life this will be a memory to treasure," she said. To her the views of the Continental Divide, the wide panorama of foam-crested peaks, the little glacial lakes, the flower-strewn meadows would be a "bank of beauty" to draw upon in memory.

Sheer above us, rose the peaks of Arapaho. The naked cliffs were something like 1000 feet above us; the south wall, in places, (Continued on page 292)

Poisoners at Work

By F. WALLACE TABER

Illustrated by
Russell O. Berg



UPSETTING IT!

IT COST us three million dollars last year to have the U. S. Fish and Wildlife Service make *good* coyotes out of 103,982 of the marauding wild dogs.

Weapons, from the ultra-deadly, war-born 1080, than which there is none more indiscriminately poisonous, to radio-equipped jeeps and planes, were thrown against the western ranks of the moonlight howlers. From California to Colorado, and from Montana to Mexico, life was a battle of wits between government exterminators and wily coyotes, with the latter retaining a decided edge.

The all-out government program, which the Fish and Wildlife Service men will tell you is a *control*, not an *extermination* campaign, is purported to be directed at reducing an alleged annual 20-million dollar livestock loss.

The *control* campaign is out of hand; often locally mismanaged and inadequately supervised; miles ahead of research; based on a fallacy; indiscriminate, and predestined to accomplish more evil than good. This, most unbiased wildlife experts will agree, is a mighty accurate over-all estimate.

Said one official who is associated with the federal predator and rodent control division: "The broad outlines of this blundering experiment has demonstrated the futility of trying to maintain sustained yields of coyotes, livestock and big game on the same area." (He speaks collectively of all predator and rodent control by whatever method.)

It is tantamount to thinking that there is still hope that Governor Dewey will make the presidential grade to believe that the livestock interests are going to concede ground. A strong Washington lobby will see to that. That leaves it up to coyotes and large animal herds to make way for more cattle and sheep.

Sportsmen and ammunition manufacturers were strong enough to block the grand-scale landgrab at-

tempted by livestock interests last year. So attention is concentrated on the coyote, which is as friendless as was Oksana Kasenkina in New York's Russian consulate.

A. Brazier Howell, nationally known wildlife expert, in 1930, pointed out that in the early 1900s the Biological Survey [now the U.S. Fish and Wildlife Service] had stressed the value of the coyote as a destroyer of rodents, but that, in later years, it had avoided any important reference to its valuable habits and had overplayed the actual extent of its damage to stock.

That time has not ameliorated, but, rather, intensified the aims and objectives guiding federal coyote executioners came to light recently when the *Denver Post* undertook to bring the highly controversial control campaign to public attention.

"I notice in one of your articles," said a federal Fish and Wildlife Service trapper, "where Washington officials claim that not more than one station, or 1080-poisoned carcass, is placed to a township. This is a damn lie. Last winter [1947-48], they had as many as seven stations of 1080 in less than a square mile on some of my territory, and they had it out a lot thicker than that in an adjacent area."

"I feel sure that, if the Fish and Wildlife Service puts out 1080 for one more winter after this one, as heavy as they did last winter, our furbearers will be a thing of the past."

This federal trapper went on to advise that the coyote was not suffering half so much from 1080-impregnated carcasses as were the mink, marten, fox and badger. He gave figures to prove his point, figures that he did not turn in to the Washington office for fear of losing his job.

In short, the entire federal predator and rodent control campaign is based in part on at least one

fallacy, namely, that such control can be selective.

Federal records verify the fact that even the well outmoded steel-trap is not selective. The coyote-getter—a setgun manufactured in Pueblo, Colorado, and designed to utilize a charge of potassium-cyanide in lieu of a bullet—is slightly more effective, possibly more humane, than the trap it is replacing. But it is far more hazardous to human life and limb.

Recently, a Colorado Springs, Colorado, geologist mistook the wool-ball bait covering the muzzle and trigger of a coyote-getter for a piece of uranium ore. The blast of cyanide struck him full in the face. Had

decessor of the Fish and Wildlife Service so expertly worked out and accepted in principle.

Because the gophers, ground squirrels and other rodents compete with livestock for forage, the federal executioners wantonly poison even the most remote mountain meadows in the West. Whole populations of prairie dogs, rabbits, gophers and other grass- and weed-eating rodents have been locally destroyed.

With its natural food supply severely decimated, the coyote, to survive, must make greater inroads into domestic poultry and livestock. It has never been denied by even the staunchest government-poisoning

critics that coyotes prey on man's domestic animals.

Even with this man-made incentive for preying on livestock, the coyote diet, according to federal researcher Charles C. Sperry, is made up of 51 percent rodents, 25 percent carrion, 10.5 percent miscellaneous items, and only 13.5 percent sheep and goats. Much of these last were admittedly range-dead carrion. The greatest loss among sheep comes at lambing time, when careless herdsmen allow the ewes to stray. Losses suffered are invariably coyote kills, the herder tells his boss.

Then, by killing off the coyote, natural enemy to the several damaging rodents, the rodents are allowed to multiply, thus providing more work for the

spreaders of strychnine-poisoned grain.

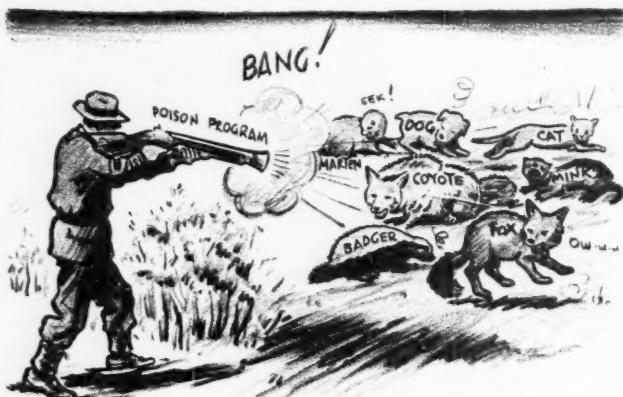
The cycle is a vicious one. In Colorado there are roughly fifty year-round, full-time employees on predator and rodent-control work. Mr. Fugate advised that he could use more than three times that number efficiently.

In addition to the money appropriated by Congress to implement the Fish and Wildlife Service's predator and rodent control work—approximately half-a-million dollars in 1946—sixteen of the western states ante an amount approximately three times that size. The overall program is further fortified by the annual payment by states and counties of nearly a million dollars in bounties.

Much of the state money comes indirectly from licensed hunters, who do not realize that they are footing the livestock interest's coyote-control bill; footing it, that is, while the livestock interests try to squeeze them out of the national forests and Taylor grazing lands.

Through adroit state lobbying, game departments are whipped into contributing to the federal program. The money they provide—\$40,000 was donated by Colorado alone in 1948—comes from the licenses paid for the privilege of hunting and fishing.

Additional state funds for predator control come as outright legislative appropriations to the livestock commissions. Still other funds for control work are



BLUNDERBUS—WITH EMPHASIS ON THE BLUNDER!

it hit him in the nostrils and mouth, instead of cheek and head, he would have been as dead as any coyote doing the same thing, according to federal biologists doing research on control methods.

As for selectivity of the highly lethal poisons—thallium, 1080 or strychnine—the word is unknown. Research shows that vultures and some hawks may not be victimized by these potent death-dealers now in vogue with federal poisoners, but only because doses of sufficient concentration were not employed.

Colorado fur division chief Dean A. Coleman pointed out recently that the marten, badger and fox were sharply on the downgrade in his State as a direct result of indiscriminate use of coyote poison.

While denying that his men were indiscriminate in their application of coyote poison, Roy Fugate, in charge of the Denver predator and rodent control office, would not say as much for the poison itself. In making his broad denial, he acknowledged that, upon at least two occasions, poisoned baits had been dropped from airplanes. He said the work was experimental, had not panned out and was not the usual custom. Yet, reports from Montana and Nevada indicate that the same type of dispersal has gone on there. It may be experimental, too, but scarcely discriminate.

In addition to being based on a fallacy, the federal program is also a vicious contradiction of the well-accepted *balance of nature*, which the respected pre-

realized through a per-head assessment levied by the county tax assessor against the livestock owners. With the livestock interests contributing to the funds, and mustering a majority of the remainder, it is quite obvious who wields the whip hand.

Bear control is ostensibly limited to eradication of the individual animal caught molesting stock. Last spring, in the North Park area of Colorado, a federal trapper poisoned several bears on the national forest at the behest of the adjacent rancher, who runs sheep on the forest practically at the expense of the public.

In the federal report, the bears controlled were listed as stock-molesting individuals. The peculiar part of the case history is three-fold: (1) the bears were poisoned prior to the time stock went on the range in the spring; (2) the U. S. Forest Service, which administered the land involved, knew nothing of the control work, although federal dictum says the land-administering agent must give consent and be fully advised; and, (3) the federal trapper was excused on the basis of being new and not fully appraised of what Washington-level officials call rigid instructions.

Actually, the whole federal program bogs down, not at the Washington level, not at the state level, but right out in the field where actual trappers, poisoners, or whatever they may be called, are dictated to by stockmen, more particularly sheepmen. Cattlemen are not particularly concerned with coyote control on the range; damage suffered by them is not appreciable.

Even the individual trappers or poisoners cannot be blamed entirely, for they are handicapped by an ironic attempt to make a right out of an inherent wrong, even when they are honest and obey rules.

In Austin, Nevada, the authenticated story is told of a federal poisoner who stopped at a local bar for a beer and remained for three days. Meanwhile, his truck, parked in front of the Casady garage, had been moved off the street. A freshly killed horse lying on the loose truck bed had dripped so much blood on the dirt street that it had created quite a mess.

Shortly after the drunk poisoner and his truck departed, the town dogs began to die off like flies. Following an agonized suffering, dogs, cats and even chickens began to drop all over town.

When the poisoner's truck and dead horse were remembered, the good citizens of Austin asked the sheriff's office to check with Malcolm Allison, district predator-control agent in Reno, and protest the sad state of affairs. Allison immediately disclaimed any connection between the truck, its load and the deaths of the Austin pets and poultry. He insisted that some

crank poisoner had taken the opportunity to spread poison.

"In a town the size of Austin," said one resident, "where every man, woman and child is intimately known to his neighbor and where most people are related, it is incredible that a poisoner could live there unnoticed."

Individual federal trappers are concerned only with producing coyote scalps at any cost. Their jobs depend upon numbers, and once reprimanded for carelessness by the Washington office for the sake of the record, in allowing non-predators to be killed, the trapper thereafter conveniently forgets to report the fur-bearers killed.

On the Uncompahgre National Forest in Colorado, forest rangers found cans of poisoned honey. Nearby, a dead black bear and several dead squirrels attested to the wantonness of the deed.

While the federal office disavows any part of such carryings on, it is well established that federal trappers practice their trade on both public and private lands without consent from custodian or owner. How



"HM! SOMEBODY MUST HAVE KILLED THEM ACCIDENTALLY"

widespread the practice, no one knows. U. S. Forest Service officials repeatedly encounter such infringements by the Fish and Wildlife Service on their property in Colorado.

Chester Perrine, a private rancher in Smokey Valley, Nye County, Nevada, returned home to find his ranch heavily poisoned. So did Peter Damele on his Dry Creek ranch in Lander County. No requests had been made, no permission given, but just assumed.

From a humane standpoint, it is highly questionable that the poisons that have replaced, to a major extent, the steel trap, are even as humane as the trap. Certainly the lingering death suffered by the victim of thallium is a far cry from the steel jaws that hurt and mangled most when the (Continued on page 289)

As We Found It



Report on Our February Questionnaire

BEFORE making a report on the results obtained from our questionnaire, published in the February, 1949, issue, we want to extend our heartfelt thanks to those who answered it, and for the considerable trouble to which they went in so doing. The helpful comments and suggestions, revealing thought and interest, exceeded our most optimistic expectations. Every one of these has been read and extracted from the questionnaire forms, making a considerable volume of record. In point of numbers of responses the results were greater than anticipated for a questionnaire that placed upon the responder the task of taking the blank from the magazine and providing envelope and postage.

Although the responses are still trickling in, we had to make a tabulation without waiting too long. So April 1 was set as the final date, at which time 1134 questionnaires had been received. Forms received since that date have been carefully read, but are not included, statistically, in the following summary. It is apparent, from the widespread geographical sources of the responses and the amazing variety of individuals answering, that we obtained a fine cross-section of our readers' opinions. Many expressed an interest in hearing the final results. So here they are—

The first group of questions dealt with editorial matters, and the first query was: "Generally, are the main articles sufficiently varied?" "To this 1102 said "yes"; 32 "No."

The second question related to emphasis, whether too simple, too scientific, or about right. Sixty-five felt our emphasis too simple; 38 too scientific; 1031 about right.

In order to obtain some idea of the relative interest in general groupings of Nature subjects, or fields, we asked readers to rate their choices by number. Some had an equal interest in more than one field. Some rated only their first three or five choices; others rated all, from one to ten. It seemed best to tabulate the first five choices. For example, 832 persons rated an interest in birds as among their first five choices, while 441 rated this interest first, and so on. The following tables are of comparative interest, both to the editors and to the statistically minded.

BIRDS	MAMMALS	FLOWERS	TREES
1..... 441	1..... 185	1..... 148	1..... 81
2..... 205	2..... 188	2..... 186	2..... 128
3..... 104	3..... 104	3..... 165	3..... 185
4..... 53	4..... 100	4..... 75	4..... 136
5..... 29	5..... 46	5..... 60	5..... 82
Total... 832	Total... 623	Total... 634	Total... 612

INSECTS	FISHES	REPTILES	GARDENS
1..... 48	1..... 24	1..... 16	1..... 39
2..... 45	2..... 22	2..... 35	2..... 50
3..... 71	3..... 55	3..... 57	3..... 80
4..... 71	4..... 45	4..... 52	4..... 82
5..... 98	5..... 67	5..... 53	5..... 77
Total... 333	Total... 213	Total... 213	Total... 328

ASTRON- OMY	GEOLOGY
1..... 34	1..... 37
2..... 46	2..... 42
3..... 43	3..... 69
4..... 56	4..... 56
5..... 49	5..... 64
Total... 228	Total... 268

In order to obtain an estimate of the reader interest in four regular departments, and in our use of poetry, we asked whether we should eliminate or retain these features. The "no opinion" category included many who indicated that a certain department did not happen to interest them but they felt it would interest others. The results were:

Continue Nature in Print, 948; eliminate, 70; no opinion, 116.

Continue Camera Trails, 859; eliminate, 108; no opinion, 167.

Continue Microscope Department, 698; eliminate, 179; no opinion, 257.

Continue School Page, 836; eliminate, 106; no opinion, 192.

Continue poetry, 772; eliminate, 187; no opinion, 175.

Next we sought to discover reader opinion with regard to our wildlife and general conservation policies. There were 978 answers in entire agreement with our policies. A few were in disagreement, and a few did not answer, while a few others qualified their agreement. Since we have, both first-hand and second-hand, said unkind things, now and then, about those who hunt for sport, largely because we feel that the true sportsman is still a small minority of those annually licensed to hunt, we wanted to discover whether we were too severe, not severe enough, or about right in this matter. Forty-one felt we picked on the hunter too much; 289 felt we were not sufficiently severe; 673 that we were about right.

Curious as to what the attitude of our readers might be on the moral aspects of killing for fun, we asked the direct question: "Do you regard sport killing as morally wrong?" Frankly, we were surprised by both the thought given to this question and the figures that resulted. About fifty per- (Continued on page 290)

A Swarm of Bees Lit on Me

By ELIZABETH LINN

Illustration by Garnet Jex

IT WAS a cool April morning—more like March than May—and as I walked out to the garage, past the beeyard, I saw the big swarm of bees on a tree. There must have been fifty or sixty thousand of them, so I did not want them to take off for the woods before I got them into a new hive. I ran for my bee-veil, crammed fuel into the bee smoker and got it puffing good clouds of smoke.

Unfortunately, the bees were in a bad position for hiving, plastered up the side of the tree trunk like thickly mottled wall paper, and, it being chilly, they were somewhat angry, rather than good natured, as is generally the case when they swarm on a warm day. I intended to transfer them from the tree to waiting hive by getting them into the large burlap swarm-bag that I carried. To make it easier, I decided to smoke them off the tree trunk, thinking they would light on a more convenient branch from which I could shake the cluster, like so many little black and gold gumdrops, into the swarm-bag.

As I smoked them with big clouds of smoke from the smoker, they left the tree trunk slowly and circled angrily in the cool air. They flew above the tree, in it, and all around me. Their buzzing din was terrific. Finally, the last bees were off the tree trunk, and then I noticed a strange thing.

Only about one-third of the number of bees that had been there in the air were to be seen. They had vanished! And more were vanishing each minute. But where? I turned and searched without success for their new alighting place. I knew they were near.

Suddenly, I became aware of a warm vibrating spot in the middle of my back, between my jacket and me, that was growing larger and louder by the second. It dawned upon me that the queen bee and all her loyal subjects had gone up beneath my jacket; for it is the rule of beedom that, where the queen alights, there also the others will follow. For a minute, I stood still in the grip of an unbelieving dull sort of horror. There was no one to rescue me. I had come alone.

Often in summer, I had watched bees swarm and wondered what I should do if a swarm ever lit on me. I would, I had decided, like the fox in the fable with his annoying fleas, go to our nearby stream, wade in up to my head, then drown the remaining bees by dipping completely under. But now I could not do this to get rid of them because the thick, late-winter ice was still on the stream; nor could I climb quietly into a full tub of water in the house to drown



them, for the water had not yet been turned on.

I stood quite still with the great buzzing pillow growing louder and warmer in the back of my jacket, trying to do some fast thinking. I did not dare to try to shake the bees out and I did not dare try to smoke them out, for they were in a most awkward position. Nor did I dare to disturb them by removing my jacket, for they were angry enough already. If I were not very careful indeed, I might be stung to death.

Then, all at once, I knew what I could do to get rid of those bees. I put down my smoker and swarm bag and walked carefully away from the beeyard.

I had remembered that on other occasions when I had come in the house from working in the beeyard, if there were a few bees clinging to my clothes, they always left me and made for the light streaming through the windows. There they would bat relentlessly up and down the windowpane, their last idea being to sting anyone. They only sought to escape.

Gingerly I walked into the house, and there in the sittingroom, with the furniture swathed in sheets, I gingerly unzipped my jacket and held it wide open for all that swarm of bees to see the light coming through the six windows, and slowly I revolved so that they would be sure to see all six windows. I held my breath, and, sure enough, the strategy began to work. The bees were taking off from my back, and soon the number at the windows was enormous and their buzzing echoed loud in the empty house. In a miraculously short time, all the bees had left me and I felt suddenly weak with happy relief. It was a keen, joyous relief, the like of which I have not felt since. Upon the windowpanes, the bees were so docile that I could open the window and shoo them out, queen and all. Where they went after that, I did not care. Throughout the whole experience I only got two stings and they occurred when I took off my jacket and crushed two bees that stung me in protest. All told, they were very polite bees, but then, so was I.

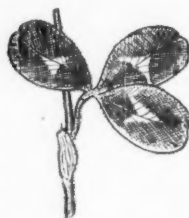
Some Clovers and Their Kin

By E. LAURENCE PALMER

MOST of us have sung or heard the popular song about looking over a four-leaved clover that we overlooked before, but few of us realize how thoroughly we have overlooked the possibilities of clovers and their kin. There are few lawns in which there are not some clovers, but most of us cannot recognize those that are there. We may eat for breakfast honey that originated in the heart of some clover-like flower. And we drink milk and eat meat that come to us thanks to an animal that thrived on a diet in which a clover, or its kin, played an important part.

When I was a youngster, I was led to believe, by my grandfather and others, that the ideal patch of clover was the one often described as being "knee-deep." Now we know that much better returns come from a pasture where the clover and other plants eaten by the cattle are kept cut to a few inches high. Thus each mouthful plucked can be swallowed immediately to make room for another mouthful. Since the cow eats about eight hours a day, it is up to us to be certain that she gets a maximum amount of the best food into her system in that time. This cannot be done if the cow takes mouthfuls of knee-deep stuff and wastes time getting some of the long, hanging ends into her mouth. Efficiency experts now have it worked out so that the cow works overtime without knowing it.

Then, too, clover plants have a lot of queer quirks that must be recognized if they are to be managed. A friend of mine, when ill, was given a dozen pills by the doctor, with the recommendation that he take one each hour. My friend felt so miserable that he decided that if one an hour was good, a dozen an hour would be better. He took the whole lot, with most unfortunate results. By the same token, while clover and clover-like plants are good as a source of forage, they are not always at their best if found in pure stands. We know, for example, that land that will produce nine hundred pounds of grass forage per acre will, if grown to clover, produce three thousand pounds. We might argue, then, that we should grow clover only. The odd part of this is that, if the



RED CLOVER



ALSIKE CLOVER



CRIMSON CLOVER



WHITE CLOVER

grass and clover are grown together, that same bit of land will yield five thousand pounds of superior food, in which the grass, as well as the clover, will have a higher nutritive value. So we cannot use weight as our only unit of measurement in determining the value. This means that, if we used weight alone as a criterion, a proper mixture would give us, from one acre, at least the equivalent of more than five acres of land planted to grass alone. This is worth thinking about.

But, you may ask, how does all this happen to be? If we take a clover plant, such as a wild white clover, we will find that it probably has a long, central, deep, root system. This reaches down into the ground where it can tap water resources not available to shallow-rooted plants. As a result, a lawn with this plant in it will remain green during a dry summer that would turn a grass lawn into a sickly brown. But the water-tapping ability is not all that counts. On that root system is a host of little, spongy structures in which live some important bacteria. These bacteria have the ability to take nitrogen from the air, and to put it into compounds that may be used as food by plants. Grasses themselves cannot harbor these bacteria, but they can use the foods that result from the growth of the clovers that harbor the bacteria. The result is that both the grasses and the clovers prosper.

Now it happens that some clovers must live on rich soil. They give a superior return in such cases, but they cannot thrive on poor soils. It also happens that other clovers can do well on poor soils, and so improve them that, eventually, the better clovers can take over. The problem, then, is to select the right clover for the soil that you have, and set about to build up conditions so that, eventually, you can make the soil support the more valuable kinds.

The clovers do have these deep roots, and they do help, but they must be considered in more ways than one. When winter comes, an unsheltered field or lawn may be covered with ice. This may heave the surface material so that the valuable tap root is torn apart. To help in this, we usually roll our lawns in spring to try to get

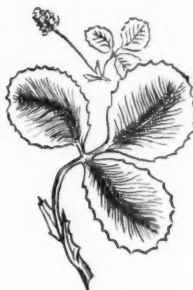
the severed parts together, although, of course, this is not the only reason. Another thing we must consider about the roots of the clover-like plants is this. Since they penetrate deeply, they may draw on a water reserve that would ordinarily not be touched. This means that plants that might support shallow-rooted plants on adjacent land will have their water supply exhausted if deep-rooted plants, like alfalfa, are growing nearby. All of this, then, calls for some careful management if a proper balance is to be maintained. Particularly is this true in such areas as, let us say, Nebraska, where the available water is definitely reduced as we move to the west.

The chart section of this article should introduce you to some of the more important clover and clover-like plants. We have tried to avoid the use of technical terms, but in some cases this was impossible because of the limitations of space. This may help you understand some of the terms used in the charts.

A clover leaf is made up of a number of parts. You know, of course, the



JAPANESE CLOVER



BLACK MEDIC



ALFALFA



Woodchuck

By AUGUST DERLETH

Coming out from behind a tree,
he stopped not four feet from me.

He knew I was something else alive, for he
had seen me coming toward that tree.

But somehow he knew I hadn't come to kill;
so he went on past me up the hill.

I could have touched him, leaning over,
where he went toward the field of clover.

Once past, he stood up tall
beside the last of an old stone wall;

He said something muted and low
in a language no alien man would know,

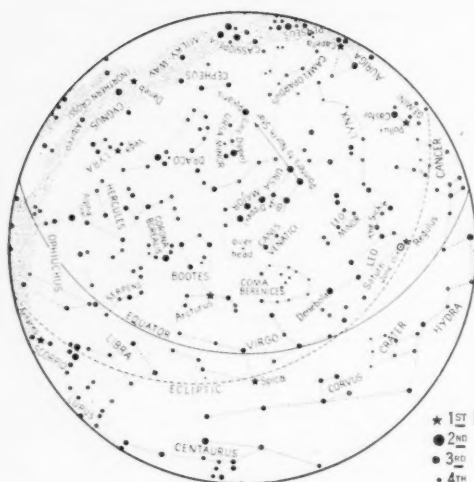
As if to say he was glad he and I
knew there was room for both under this sky.

three leaflets. On occasion we have said that some of these are stalked, referring to the section that attaches them at the base. We have used the term *mucronate*, reluctantly, to describe a tip that is blunt superficially, but has a small point in the very center. We are sure you will understand the other terms applied to the leaflets. At the base of a leaf of clover, or clover-like plant, is usually a significant structure spoken of as the *stipule*. This is where the leaf joins the stem, and its shape and structure are often important in making a determination. We have purposely avoided using flower characters since these are not commonly available to help you identify a "clover-leaf" plucked from a lawn or roadside. With this help you should be able to identify and understand something of most of the common clovers and clover-like plants found in lawns and in waste places.

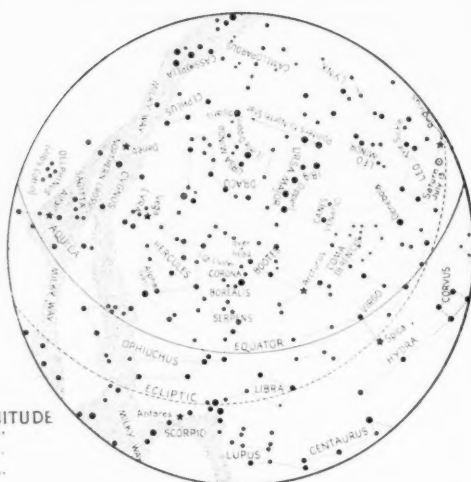
We must acknowledge help from Professor D. B. Johnstone-Wallace, whose studies of the vegetative characters of clover have proved most helpful in bringing this article to you.

COMMON NAME SCIENTIFIC NAME	ALFALFA <i>Medicago sativa</i>	BLACK MEDIC, YELLOW TREFOIL <i>Medicago lupulina</i>	JAPANESE CLOVER ET AL <i>Lespedeza striata</i> et al	WHITE CLOVERS <i>Trifolium repens</i>
DESCRIPTION OF VEGETATIVE PARTS	Stem, erect or somewhat sprawling, freely branched, reaching to 3 feet or more, usually rather smooth, but sometimes is hairy. Stems arise from crown. Leaves of 3 leaflets, whose margins are toothed only near the tip and whose tips are mucronate or sometimes obscurely so. Stipules are pointed and with toothed edges.	Low sprawling stems that may be over 2 feet long and are tough, slender, branching, but spring from a deep, central root system. Leaves are of 3 leaflets, hairy, dark bluish-green, with terminal leaflet conspicuously long-stalked, to $\frac{3}{8}$ -inch long, narrowed at base. Stipules, large, sharp-pointed, with branched veins.	Stems may be tall or sprawling, somewhat fuzzy. Leaves of 3 leaflets, without mucronate tips, and the terminal leaflet with a long stalk in <i>L. sericea</i> and short stalks in <i>L. procumbens</i> , <i>L. striata</i> and <i>L. stipulacea</i> . In <i>L. procumbens</i> the stems are very hairy. Leaves with fine, straight veins.	Stems, prostrate, smooth, rooting at the joints. Leaves, with 3 leaflets, smooth, without mucronate tips, with finely notched margins and somewhat notched tip, glossy beneath, about as broad as long, with or without light V marking. Stipules small, sharp-pointed, with purple veins.
RANGE AND RELATIVES	Native of Europe, but naturalized throughout temperate parts of the world. May become established in waste places. Of the 50 species known in the genus, only about a dozen are considered as being commercially important. Important varieties include the Grim and the Variegated.	Native of Europe, but commonly established in America and sometimes grown as a forage crop on poorer soils. It is distinctly a temperate-zone plant, not doing well in the colder northern areas, or in the hotter tropical areas. Seeds closely resemble those of closely related alfalfa, but have distinctive nub.	<i>L. striata</i> is of Japanese origin and has inconspicuous papery, narrow stipules and oval leaflets. <i>L. stipulacea</i> is Korean, and has broad leaflets and broad, conspicuous, sharply pointed stipules. In each of these, the stems are less hairy than in <i>L. procumbens</i> . <i>L. striata</i> introduced about 1846.	<i>Ladino</i> is perennial, has large leaflets, favors neutral soils and much moisture and is from southwestern Europe. <i>Dutch</i> is probably biennial, with medium leaflets and native of Europe. <i>Wild White</i> has very small leaflets, is perennial and is native of North America.
FLOWERS AND REPRODUCTION	Flowers, in dense blue, short, terminal clusters. Individual flowers are about $\frac{1}{4}$ -inch long, and from them extend the yellow stamens that we all love to "trip" with a pin or thorn. Fruit-pod forms a spiral, or a series of spirals, like a screw, and each fruit bears many yellowish seeds.	Flowers in small, compact, yellow clusters or heads, each head being almost spherical and to $\frac{1}{6}$ -inch through or larger. Individual flowers are about $\frac{1}{12}$ -inch long and are greatly crowded. Fruit forms a small, close spiral that, when mature, is black, giving the species its common name.	In <i>L. striata</i> , flowers are small, pink to purple clusters, and are borne in the axils of the leaves. There are conspicuous flower bracts that may be seen. Fruit is an oval seed pod, each bearing one seed. Seeds sown early in season at 15 to 25 lbs. per acre.	Flowers, white, small, pea-like, sometimes pinkish, flowering May through December and bend backwards when mature. <i>Ladino</i> has largest flowers and has from 80 flowers in a head. Heads of <i>Dutch</i> and <i>Wild White</i> smaller flowered and with about 33 flowers to the head. Fruits with 2-several seeds.
CULTURE	Seeds sown in new fields may need bacterial inoculation. Sow 12-20 pounds per acre with ample potash and phosphorus, usually in early summer on weed-free land but usually with a nurse crop. Good stands may yield to 10 crops a year, but deep root system may rob adjacent soil of needed water.	Plant bears flowers from early summer to latest autumn. It is a soil enricher and, on occasion, may be the best forage plant a given poor soil can support. It is most commonly found in lawns and in waste places, particularly at the edges of sidewalks over which the stems may sprawl.	Japanese clover is a popular pasture plant in the South. It is often sown with oats for soil enrichment and for post grain harvest forage, but in this case it is usually sown in autumn rather than in spring. It does well on land that is not too good and that gets mediocre care. Yield may be over 2 tons.	Except for seed crops white clovers do best grown with grasses with 1 lb. of wild white seed added to other clover allotment per acre, or 2 lbs. added to normal grass acre allotment ample. 4-6 lbs. used for clear seed plots. Usually rolled in. <i>Wild White</i> plant may have dozen stems covering 4 square yards.
ECONOMIC IMPORTANCE	One of the best known and most popular of forage and hay crops; fairly free from insect and fungus enemies, and once established may give a sustained yield for some years. Hay should be cut just as plants come into bloom, and should be protected from rain to get best results.	May serve well in lawns on poor soil to enrich the soil so that, later, superior lawn plants may be supported. It is known in the seed trade as None-such, and one can get strains that are annual, biennial or perennial, the former being preferred where it is desired that the use is to be temporary.	Plant popular because of its ability to get along on relatively poor soils. It can survive with little lime. It reseeds itself abundantly, and if it does not happen to grow high enough to be harvested as hay then it has helped enrich the soil, and it can be used as a superior forage.	In Northeast, <i>Wild White</i> grown with Kentucky blue grass may yield 5000 pounds of good food per acre, as contrasted with 900 pounds for grass alone or 3000 pounds for clover alone. <i>Dutch</i> may need to be seeded every other year, <i>Ladino</i> every 6 years, while <i>Wild White</i> may be permanent.

ALSIKE CLOVER <i>Trifolium hybridum</i>	RED CLOVER <i>Trifolium pratense</i>	CRIMSON CLOVER <i>Trifolium incarnatum</i>	OTHER CLOVERS <i>Trifolium</i> sp.	WILD SWEET CLOVER <i>Melilotus alba</i>
Stems, erect, smooth, not rooting at joints. Leaves, with 3 leaflets, smooth, without mucronate tips, dull rather than shining beneath, nearly as broad as long, unmarked, with toothed margins. Stipules, broad at base and tapering to a point, with branching veins. Stems not wholly erect.	Stems, erect or ascending from deep taproot, hairy. Leaves, with 3 leaflets, hairy, without mucronate tips, terminal leaflets not stalked, with or without light V marking, broad but not as broad as long, each leaflet being to 2 inches long, with indistinct veins on back. Stipules, long and pointed.	Stems, erect to 3 feet high, sparingly branched, softly hairy. Leaves of 3 leaflets each to 1 1/4-inch long, blunt or slightly indented at free end with margins finely toothed and terminal leaflet stalkless. Stipules blunt, to 1 inch broad, thin and with toothed margins.	<i>Smooth</i> introduced species include the creeping, broad-stipuled, narrow-leafleted, finely toothed Strawberry Clover, <i>T. fragiferum</i> , and the narrowly based-pointed, stipuled, non-creeping, broader-leafleted Golden Hop Clover, <i>T. agrarium</i> , neither having terminal leaflet long-stalked.	Stems, erect, coarse, strong and tough, smooth, branched. Leaves, of 3 leaflets whose margins are toothed throughout and which are narrow, somewhat bitter, or with a strong sweet-grass fragrance. Terminal leaflet is long-stalked and narrowed at base, with mucronate tips. All leaflets may fold. Stem may reach height of 10 feet.
Native of northern Europe, whence it was brought to America in 1839, and has become widely established and particularly popular in the Northeast. It may thrive on soils too wet for red clover, or too acid for that species, and is grown primarily as a forage and soil restorer.	Native of Europe and Asia but widely established in temperate parts of the world, and particularly in the United States. Cultivated in Spain in 15th Century, brought to England in 1633 and to America probably 1747. It is least popular in Great Plains and Rocky Mountain areas.	Native of Europe and introduced into America, where it is uncommonly cultivated, or grown for ornament, from the Gulf of Mexico to Canada. It may escape and be found in waste places, or, on occasion, in lawns. It may be grown for forage or for green manure purposes.	<i>Hairy</i> introduced species include Zig-zag Clover, <i>T. medium</i> , with no stalk on terminal leaflet and with long pointed stipules; and the small, short-pointed, stipuled Hop Clovers, <i>T. procumbens</i> , <i>T. minus</i> , and <i>T. dubia</i> . Most of these are introduced from Europe or Asia.	Native of Europe and Asia, but introduced and thoroughly established in America where it grows as a weed, or, in some places, as a crop. The related yellow-flowered <i>Melilotus officinalis</i> seems to be more abundant in the middle West than in the East, and its leaflets are usually less blunt.
Flowers white to pink, turning backward when mature, borne in heads at ends of stems, or on long stems from the leaf axils. Pollination is effected by activity of bees, as is the case with the other clovers, although this species is more likely to get a good set than is red clover.	Flowers, pea-like, reddish to pink, remaining erect in many-flowered heads even after maturing. Heads to 1 inch long and individual flowers to 1/2-inch. Calyx hairy with teeth shorter than corolla. Honey bee's 1/4-inch proboscis too short to reach bottom of 2/5-inch tube, but bumblebee's long enough.	Flowers borne in erect rather pointed cone-like heads that may be to 2 1/2 inches long, the heads themselves being single. Flowers, crimson, showy, each to 1/2-inch long, with corolla exceeding the calyx lobes, with the calyx being conspicuously hairy, the hairs being stiff at maturity.	Flowers are all small, pea-like, with under 12 to a head in <i>T. dubia</i> , with the fruiting head of <i>T. fragiferum</i> forming a strawberry-like structure that gives the plant its common name. Flowers are yellow in <i>T. agrarium</i> and deep red in <i>T. medium</i> .	Flowers are borne on slender, beautiful spikes at the ends of branches, the spikes being to 4 inches long and most slender at the tips. Flowers of <i>M. alba</i> are white, to 1/4-inch long, pea-like, very fragrant, producing a pod that bears a single, yellow, egg-shaped, fragrant seed. The plant may be annual or biennial.
Usually grown with other clovers, or mixed with suitable grasses, and, like other clovers, bears nodules that harbor nitrogen-fixing bacteria. Valuable source of nectar for honey producers. Use 4 to 5 pounds of seed per acre, or, for seed crop, from 8 to 15 pounds. 700,000 seeds per pound.	Commonly sown in spring, unmixed with other plants, at 8-10 pounds of seed per acre, or mixed with timothy or small grains for crop after grain harvest. Clover may reach height of 6 inches and a good hay crop may be cut second spring and later in second season.	Seed sown at 10-15 pounds per acre in late summer or early fall, germinates quickly and establishes good forage bed early if sufficient water is available. 100 lbs. of good, unhulled seed is the equivalent of about 60 lbs. of hulled seed. Seed is commonly grown for local consumption.	In America these clovers do not compete in popularity or usefulness with the other species considered, and cannot ordinarily be found in abundance except under unusual circumstances. Zig-zag is often spoken of as Mammoth Clover, and may be grown locally for forage and hay.	At its best in lime-loaded soils, but prospers on poor neutral soils, which it may enrich with its nitrogen-encouraging nodules and anchor with its deeply penetrating roots. The flowers are excellent nectar producers and are so recognized by bees. When under cultivation, 20 pounds of seed are used per acre.
Seed crops may yield to 4 bushels per acre. Stimulates volume and quality of grass forage in associated plants. Roughly, 100 pounds of clover feed yields following percentages: Protein: red, 7.38; alsike, 8.15; white, 11.46; crimson, 10.49. Carbohydrate: red, 38.15; alsike, 41.7; white, 41.8; crimson, 38.1.	Mammoth Red Clover, <i>T. pratense perenne</i> , flowers late, and has usually over 12 solid stems and is perennial. Medium Red <i>T. pratense</i> flowers early, has usually hollow stems usually less than 12 to a plant, usually has light V on leaflets which may be lacking in Mammoth Red. Grown mostly for hay and soil improvement.	Introduced into United States about 1818, it has had varied popularity. It makes excellent green manure for plowing under because of its quick development, but the stiff-haired flower heads form balls in stomachs of cattle, and may cause death, decreasing forage values greatly.	Mammoth Clover is characterized by a distinct absence of spots on the leaflets, and by the entire, long leaflets. Common names are unfortunately applied locally to different species, which makes safe discussion difficult in a short treatment, such as is here possible.	Grown as a hay crop, the plant may yield two crops a year, but many animals have to be trained to eat it. Plant is sometimes known as Bokhara clover when considered commercially, but to most of us it is recognized as a beautiful weed to be found in widely separated waste places.



9 P.M., June 1; 8 P.M., June 15



9 P.M., July 1; 8 P.M., July 15

To use these maps hold them before you in a vertical position and turn until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

The Heavens in June and July

By ISABEL M. LEWIS

THERE is one time of the year, the early evening hours of late May and early June, when the Milky Way lies in or close to the horizon. Then it is seen very poorly, if at all. Toward the end of June, however, one may see, in the east, a part of the Milky Way coming into view, and by the end of July it is conspicuously visible in the eastern half of the sky.

In the winter months, it will be recalled, the Milky Way arches diagonally across the heavens, from Cassiopeia and Cepheus through Perseus and Auriga, across the feet of Gemini and through Monoceros, east and southeast of Orion, to the southern horizon. From there it passes through the huge constellation of Argo Navis, which has been divided into its various parts—Vela, Puppis, Carina, and Pyxis—into the constellation of Crux. The Cross and Centaurus. At that point it turns northward, passing through the constellation of Lupus and Ara of the southern hemisphere to Sagittarius and Scorpio.

It is in these constellations that the Milky Way may be seen on the southeastern horizon late in June in the evening hours. Between Cassiopeia, now in the northeastern sky, and the top of the Northern Cross in the constellation of Cygnus. The Swan, the Milky Way appears as one broad band of hazy light. In Cygnus, however, a marked change takes place. In addition to

several conspicuous dark patches, a dark rift appears. This extends diagonally across the sky to the southern horizon, dividing the Milky Way into two distinct branches, one passing through Aquila to Sagittarius, and the other through Ophiuchus to Scorpio. The two branches meet once more near the southeastern horizon.

The Milky Way, or Galaxy, represents a vast, flattened system of stars, cosmic dust, and gaseous matter, both luminous and dark, which is in rapid rotation about an axis at right angles to its central plane. According to the best estimates now available, The Galaxy has an extent of about 100,000 light years and a width varying from about 3000 to 5000 light years, with a spherical-shaped bulge in the region of its center extending several thousand light years farther above and below the galactic plane. The sun's place in The Galaxy is that of an average-sized star close to the central plane and about 30,000 light years from its center, which lies in the constellation of Sagittarius. At the velocity with which it is revolving in its orbit around the central axis of rotation, which is about 200 miles per second, it will take about 220,000,000 years to complete one revolution.

The central nucleus of The Galaxy is hidden from our view by vast, obscuring star-clouds. Exterior to our galaxy, or Milky Way system, are the great

systems, similar to and independent of it, consisting, like the galaxy, of vast star-clouds intermingled with dark and luminous gaseous nebulae and cosmic dust. They are the spiral, elliptical and spheroidal nebulae, each containing from a thousand million to fifty thousand million suns. These are the external galaxies, of which The Greater and Lesser Magellanic Clouds and The Great Andromeda Nebula are among the nearest and most illustrious examples. The latter is at a distance of about 700,000 light years, and the Greater and Lesser Clouds are, respectively, 95,000 and 85,000 light years distant. Members of the local group of galaxies, as it is called, include these and other comparatively near galaxies within about one million light years of our own galaxy.

The most remarkable fact about these great external galaxies is that they are apparently receding from us at tremendously high velocities — greater than that of any other known astronomical objects—and that these velocities increase with distance. They range from more than a thousand miles per second, for galaxies within a few million light years of our system, to velocities as high as about a seventh of the velocity of light itself, or 26,000 miles a second, for objects distant more than two hundred million light years.

These great external galaxies are numbered by the millions, and, for the faintest photographic magnitudes, outnumber the stars. The 100-inch Mt. Wilson reflector will show nebulae distinguishable from stars at the limiting magnitude of 21.5, which can be attained with long photographic exposure. Dr. Edwin Hubble, in his *Realm of the Nebulae*, states that this limiting magnitude represents an average distance of the order of 500 million light years, and that about 100 million galaxies may be expected within a sphere of this radius.

Along the plane of the Milky Way, and for some distance above and below it, external galaxies are not observable because of the great mass of obscuring matter—star-clouds, gaseous nebulae, and cosmic dust—that lies within our own galaxy in and near the Milky Way. But in the direction of the poles of the Milky Way clusters of external galaxies may be counted in great numbers. In these directions, farthest from the plane of the galaxy, stars are fewest in number and we can penetrate farthest into space. The north pole of The Galaxy lies near the constellation of Coma Berenices in our summer evening skies,

and its south pole is a few degrees from Beta Ceti. Galaxies, like stars, tend to occur in clusters, and in the months of June and July, when the Galaxy lies near the horizon, these regions in which the galaxies lie in greatest numbers are high in the heavens.

Only on the photographic plates obtained by long exposure, with the most powerful of telescopes, may one expect, however, to obtain glimpses of these most distant of astronomical objects. Near the center of the triangle formed by the bright stars, Regulus, Spica, and Arcturus lies the Virgo cluster of galaxies. This is the nearest of all the great clusters of galaxies,

and is at a distance of about seven million light years. There are several hundred members in this cluster, and, on the whole, the group is receding from our galaxy at the rate of 700 miles a second, although there is a range of about twice this amount among the different members. According to Shapley, writing in *Galaxies*, there are known to be twenty-five clusters of galaxies that are as rich, or richer, in members than the Virgo cluster, while there are a hundred groups that are as populous as the

local group of galaxies, which includes galaxies within a million light years of our own galaxy. Not only stars, but galaxies as well, tend to travel in groups and clusters. The Virgo cluster is not far from the north pole of The Galaxy. It was discovered many years ago that there are many more galaxies north of the Milky Way in Virgo, Coma Berenices, Bootes, Corona Borealis, and other regions now in view in our summer skies, than south of it in Andromeda, Sculptor, Cetus, and Pisces, although tens of thousands of galaxies exist in those regions.

In the constellation of Corona Borealis, within an area of the sky about equal to that covered by the full moon, is a great cluster of galaxies of about four hundred members, most of which are elliptical in shape. Its distance is estimated to be about 125 million light years, and the group is receding from our galaxy with a velocity of 13,100 miles per second. The faintest members of this cluster are at the limit of visibility of the 100-inch reflector. There is, also, a region near the north pole of our galaxy where objects that can be recognized as nebulae are at an average distance of 500 million light years. Recently, in testing the Hale telescope on Mount Palomar, Dr. Hubble has detected the existence of a galaxy at a distance twice as great, or a billion light years.

In the evening skies, in (Continued on page 290)

Nocturnal Needlework

By JOHN NIXON, JR.

Embroidered on the night just now was such
A weird design of lightning that no doubt
Not even the embroiderer thought much
Of it. At least he jerked the stitches out
As soon as they were in. And now he roars
His mighty wrath at needles and the thread,
Selects new hoops, and stubbornly once more
Attempts to satin-stitch the thunderhead.
Such curses have I never heard! This try
Was even less successful; jagged floss
Sped out in twelve directions on the sky,
Twisting and tangling all around the cross
Old craftsman. Soon, though, he will find the skein
That will obey him best—his hank of rain!

Camera Trails

By EDNA HOFFMAN EVANS

JUNE—it is a month beloved by poets and song writers, and by the authors of romantic stories, as well. Spring has really taken hold, but the novelty of warm weather, blooming flowers and leafy trees has not yet worn off. Schools dismiss for the summer months and vacation days are just ahead.

Vacation, of course, means more photographic opportunities, whether at the sea shore, in the mountains, or just somewhere off the home stamping grounds. There is scarcely a family or a vacationing individual in the country who does not include a camera in the holiday equipment. Said camera may be of the dollar variety from the corner drug store, or may boast of extras and accessories that will send its price well into the three-figure bracket.

But whatever the kind of camera, or wherever vacation plans lead, each photographer will want his summer crop of pictures to be the best he ever took.

How can such a worthy aim be accomplished? Volumes have been written on this highly complex subject. Volumes more can be written without ever exhausting it. There are, of course, some factors over which the individual photographer has no control. His equipment (or lack of it) may limit him. Weather conditions may not always be cooperative. Time, place, or lack of opportunity have their effects.

But there is one factor in good photography that any individual photographer can take care of for himself. That factor is composition—the artistic and satisfying arrangement of the subject or subjects he is photographing. Composition means the difference between a snapshot and a picture, between a bare fact and a harmonious picturization. Not that facts cannot be artistic—it is the way they are presented that makes the difference.

In composition, the photographer moves into the realm of the artist. The artist, however, has much more leeway than the photographer does. The artist, as he draws or paints, can rearrange, eliminate, modify sizes and shapes to suit himself. The photographer, instead, must take the scene as he finds it, and change his own location and that of his camera until he attains the desired results.



This picture of Oak Creek Canyon, one of the scenic wonders of the Southwest, contains too much detail. It is a factual document but not an artistic composition.



By cropping a picture, cutting away portions from top, sides and bottom, a much better composition can often be obtained. The entire negative is printed here, and the dotted lines indicate the portion to be retained.

I have long maintained that the Nature photographer, particularly, can do little so far as composing his pictures is concerned. He takes his on-the-wing pictures when and wherever he can get them. His animal subjects rarely pose in the best possible locations, nor will flowers bloom where photographic conditions are one hundred percent perfect.

There are times, however, when the Nature photographer can compose his pictures. Landscapes, for example, give endless opportunities for this.

There are two ways to approach the subject. The photographer can compose his picture before he takes it; that is, he can maneuver and peer, experiment and test, until he gets just the right location. Or he can compose after his negative has been developed and he is ready to print the final picture.

All right; in either case, what shall he eliminate and what shall he emphasize? Here is where individual differences enter in. One person may like this arrangement, while another may prefer something entirely different. I have been amused often, in sitting in on various camera club discussions, to note the variety of tastes represented. One member wants to crop a picture here; another wants it cropped there. A third thinks an entirely different viewpoint should have been tried. And on it goes. Rarely do any two members agree on actual details, although nearly all approach a median line of agreement as to what constitutes good and bad. That meeting ground, then, is the region of good composition.

But how about some rules? Just what is good composition?

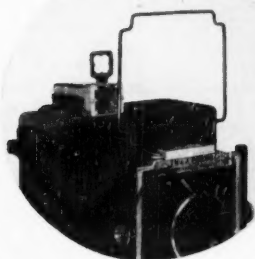
There are certain so-called "laws of composition," but they should not be followed slavishly. After all, the successful violation of these laws has frequently been an indication of artistic ability. Slavish obedience to the laws of composition can never make up for lack of imagination or personality.

No law of composition is absolute and final; it may be changed tomorrow. Nonetheless, a well-composed picture has "something." What is it?

First of all, compositional elements exist in relation to the lines that are determined by the shape of the picture space. An artistic arrangement suitable for a horizontal picture may prove completely wrong in a vertical one.

Let us think of our picture as a matter of lines. Is there a horizontal line—say the horizon—that cuts across it? Where in the picture should that line come?

Before we locate it, let us decide what result we are striving to gain. Is there something in the foreground, under the horizon



Wire finders, like this new one designed for B&J press cameras, serve admirably in composing pictures. Such a finder is especially useful in fast action shots when there is not time to use a groundglass or other viewfinder.

line, that has dramatic or pictorial appeal? If so, let us push the horizon well up toward the top of our picture. On the other hand, if the vastness of the sky, or a dramatic cloud formation is what we want to emphasize, push the horizon line down and give more space to the sky. Rarely, if ever, should the horizon cut our picture exactly in two.

Now for vertical lines; they, too, are important. But here again we must avoid placing our main vertical line squarely in the middle of the picture, unless, of course, it is so important that we wish to emphasize it in this manner.

Diagonal lines and curved ones, both highly important in art and photography, should lead the eye into the picture, rather than away from it. Not that they all should end inside the picture (before they reach the margin); but they should be so located that they lead into rather than out of the picture.

To make the discussion of composition more definite, let us consider the mountain picture used as an illustration. There was something satisfying about the scene when I took it. After the picture was printed—and I printed the entire negative—I took it over to my artist friend and we tore it apart and put it back together again.

We decided that the entire negative took in too much territory. There was just too much in it for good composition. To narrow the field we cut a frame, somewhat smaller than the picture itself, and proceeded to shift it until we had eliminated the most objectionable portions. This technique can be followed to advantage with almost any picture. It can be used before the picture is taken. Most landscape artists "frame" their scenes before they ever begin to paint. It can be done when the negative is in the enlarger, before sensitized paper is placed on the frame, or it can be done, as we did it, after the print has been made.

The original print, as one can see, con-

sisted of approximately one-third sky, one-third mountain, and one-third foreground. Such exact proportions are not too desirable. Thus, as indicated, we eliminated part of the sky, deciding it could be spared because there was nothing of interest in it, and because too much of it detracted from the majestic sweep of the mountain.

A portion of the foreground went, too, because there was nothing in it. We cut the left side to keep the light, wide portion of the road from leading us out of the picture, and, instead, let the "S" curve conduct the eye into the center. The right side was left unchanged, allowing the diagonal line of the fence to keep the road from leading us out of the picture on that side.

There were still a few factors that kept the picture from being one hundred percent perfect, at least from the artist's point of view. The road in the foreground was too light, but that could be remedied in a second printing. The sky was too blank, but the sky was blank—a cold, blue-white winter sky. To "doctor" it up with clouds would not be true to Nature. On that fact I stood adamant.

On the whole, though, we agreed fairly well as to basic elements of composition. Areas should not be divided equally. Lines should lead the eye into the picture. Spaces of light or dark should not be placed so as to overbalance other sections of the picture.

It is strange how "framing" a picture will change its appearance. Time and again I have looked at an appealing stretch of landscape; such scenes almost beg to be photographed. But, when I view them again through the camera's groundglass, or through a viewfinder, they have nothing.

Photography is like that, particularly when we reduce the colors of Nature to values of black, gray, and white. When the greens are gone, and the reds and the blues, the yellows, the golds, and the violets, there is something missing, something that only good composition can supplant. When, in addition, you remove the songs of the birds and the whisper of the wind in the trees, the scent of the woods, and the feel of the sunshine, you have a great handicap to overcome in your photographic rendition of Nature.

Note the other picture used as illustration. It is a section of Oak Creek Canyon, one of the scenic wonders of the Southwest. As a picture, except for documentary evidence, it has nothing. At least, it says nothing to me. Yet I recall the actual scene—the glowing red-gold of the eroded rocks, towering like spires above the green slopes; the trees were almost yellow where the sunlight touched them, and nearly black where they lay in shadow. Below, where the slope dropped off abruptly in a sheer canyon wall, the rocks were darker, grayish and

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streaked with the marks of time. But I had tried to crowd too much into my negative. As a result, I have nothing but a mass of detail; a picture, but not a composition. Even if I tried to select some small segment of the total negative, I would not have a desirable composition, for it is the vastness rather than the minuteness of detail that appeals in Oak Creek Canyon. Nature there is the artist, and the masterpiece is constructed on a colossal scale. Only by diligent search can the photographer find details that can be subtracted from the magnificent whole.

So it would seem that while every correct exposure produces a photograph, not every photograph becomes an artistic composition.

RANDOM REPORTS

Burke and James, Inc. report two new items in the photographic line—a new wire frame sports finder for their B&J press cameras, and a new model Solar Enlarger, the Solar 57HC. A wire finder, like the one mentioned, serves admirably in “composing” pictures. In fact, most rapid-fire sports and news photographers depend on the frame rather than on groundglass or viewfinder in making their pictures.

The FR Corporation reports that its contact printing frame, formerly available only as a part of the whole home developing and printing kit, can now be obtained as a separate FR product.

Kalart has on the market a new “safety first” speed flash.

Finally, there is a new Bolsey 35mm camera on the market—the Bolsey model 2B. Additional information can be obtained from dealers or from the Bolsey Corporation, 118 East 25th Street, New York 10, N. Y. Mention “Camera Trails,” of course.

THE WAYS OF A LAND CRAB

(Continued from page 269)

on the mound of soil and entered, left side first. A few seconds later, probably after finding the burrow occupied, he came back out, turned around again, and entered with his big claw forward. Expecting a fight, I had set up my camera. From behind a tree I could see part of the wide entrance without frightening the occupants. Only the legs of 133 were visible, but from several quick movements I knew some sort of contact had been established.

Nothing developed, and, at about half-hour intervals, the dark legs of 133 were still in the same position. At dusk the crabs were in a perfect deadlock. The pale owner of the burrow had advanced as far as possible on the intruder but was able neither to chase him out nor to pass him and leave the burrow. The stranger, on the other hand, was not able to rout or to bypass the tenant.

Realizing I was prolonging this static duel, I closed the mouth of the burrow with an inverted can. In the morning I found the situation unchanged. This continued until there were two hours of downpour early in the afternoon. When the sky cleared, 133 was gone. The pale defender was outside feeding, but raced for the hole as I approached. Although I never saw the big oily male again, I felt he had served me admirably.

The records of burrow D4 showed that, in this well-populated area at least, a good burrow is frequently in demand. Between April 30 and May 20 I captured four specimens, all males, at this large burrow. Each of them, in turn, was either retained as a specimen or moved to a considerable distance after being marked. Within a day or two the hole would again be in use, sometimes by a much smaller animal than the original. A fifth tenant had taken over the quarters at my last observation.

Whether this represents local shifting or extensive wandering I cannot say. Neither can I say whether the movements of this species are associated with reproduction, with overcrowding, seasonal changes in the food supply, or other factors.

Native Panamanians insisted that the crabs come out at night to feed. Although I found several killed on roadways, possibly at night, four nocturnal searches, in a variety of weather conditions, yielded only two specimens. One was a male, the other a female with eggs. This hunting was done in places where I regularly saw dozens of crabs during the first few hours after sunrise, and the last few hours before dark. They were out in fewer numbers in the middle of the day. When I placed bits of twigs or grass over occupied burrows at night and checked them again just before dawn, I found about 75 percent undisturbed.

My last hasty note, made when my ship steamed in past the breakwater, was that I had found two females, which had been carrying eggs, killed on the road some distance from any known burrows. It is possible that their breeding season coincides with Panama's rainy season, which was getting under way at that time. They may have left their burrows in response to some strange urge that sends them back to the sea for the casting of their eggs.

Whatever else the burrow may mean to this land crab, it is certainly his primary defense. If caught too far for retreat, he may freeze motionless, with claws folded inward close to the ground. If disturbed, then, he will back up slowly, striking viciously with open³ chelipeds. And if actually captured he may secrete a defensive fluid from his mouth, or perhaps even sacrifice a leg or claw in order to escape. But his first line of defense is the security of that hole.

Aside from their breeding, however, I found that these crabs are by no means

divorced from the water that their ancestors needed as a source of oxygen. Once I saw a crab leave its burrow near the bay, and, when I succeeded in cutting off its retreat, it ran into the water, submerged, and disappeared toward some protruding rocks. I noticed, further, that, after hard rains, burrows that were completely submerged for as long as an hour were still used. The crabs would wade into their holes as I approached. One specimen, captured a hundred yards from the bay, I placed in a fruit jar full of sea water and inverted it in the bay so it contained no air space. After three hours and forty minutes, when I approached at dusk, the crab dived briskly to the bottom in an apparent effort to hide. Likewise several specimens remained normally active when kept in a dry can for three days, fed on grass, apple cores, and banana peels. When released they seemed perfectly healthy.

While packing my gear to get about the more urgent business ahead, I found in my desk drawer a filing card with a list of questions with which I had begun my stalking of *Cardisoma guanhumi*. I might have added many more. What was there about that strip of ground overlying a drainage pipe that was so attractive to crabs? On a five-foot strip some forty yards long I counted 93 active burrows, while in the equivalent area on each side of this strip I found a total of only six holes. What is the significance of the plots or “communities” of crabs, where holes are as close as a foot from each other, while similar adjoining areas are so thinly populated? Some individuals are consistently tamer than others. Do those living in thickly populated areas really average tamer than those at isolated burrows, as appeared from a few observations? Or is the individuality a matter of experience with enemies? And what are their enemies, anyway, aside from the natives who occasionally hunt them for food? And what are the real answers to questions about territory and dominance?

Perhaps, if the answers are not already known, someone on a more peaceful mission will find them.

Crisis Spots

So approving was the reception of the booklet, “Crisis Spots in Conservation,” published by the Denver office of the Izaak Walton League of America, 327 C.A. Johnson Building, Denver 2, Colorado, that a new edition is available at twenty-five cents a copy. This is a letter-size, looseleaf booklet with the pages perforated for insertion in a ring binder and for addition of supplementary pages. It provides background information on major problem areas in the conservation field. Fifty-four general and specific resource areas are covered in this first printing, and the material was assembled and prepared by Arthur H. Carhart in association with the League.

POISONERS AT WORK

(Continued from page 277)

victim struggles. Thallium requires from 25 to 72 hours to effect death, with the marked victim, often getting slightly less than the lethal dose, losing its hair, having its internal organs shrivel, becoming paralyzed and in other ways being tortured beyond description.

The "miracle" poison—1080—is from 8 to 80 times more toxic than thallium sulphate, and from 2 to 10 times more toxic than strychnine alkaloid. While requiring far less time to kill, it presents two decided hazards not appreciably present in other poisons. First, there is absolutely no known antidote. Secondly, the frequency of secondary poisoning cases, in which a second, third, or even more remote victim succumbs from feeding upon an earlier victim, is high. Too, 1080 is poisonous, usually fatally so, to any and all animals consuming it.

The Fish and Wildlife Service reports success with the use of 1080 ranging from excellent to phenomenal. Particularly is 1080 lethal to members of the dog and cat family. Just why it is so ultra-poisonous to man's closest friends remains to be fully explained, but many is the good ranch dog that has succumbed from eating a poisoned gopher or prairie dog.

While it is obvious, at the outset, that the predator animal and rodent control campaign is carried on purely in satisfaction of a minority interest, there seems little promise of anything other than greater intensification of the program. With livestock interests holding the whip hand, with a devastating, miraculous poison now available, with an over-zealous Fish and Wildlife Service bent on—or pressured into—steadfastly retaining one of its most deeply imbedded forts—with all this chances are strong that even an aroused public will fail to bring about any great degree of reform.

Rockland Birds

"Birds of Rockland County, New York," is the recent publication of The Rockland County Audubon Society, West Nyack, New York. It is not a field guide but an attempt to focus attention on the birds found around the year in this immediate area. It first lists the birds that one may expect to find each month of the year in this region, and then supplies a check list of local birds. Price 50 cents.

Successor to Fauna

"America's First Zoo" is the title of a four-page pamphlet issued by the Zoological Society of Philadelphia as a successor to *Fauna*, the recent victim of increased costs of publication. This first issue treats with the diamond anniversary of the Philadelphia Zoological Garden, which first opened its gates in 1874. Other brief items of interest to zoo friends and supporters are included.

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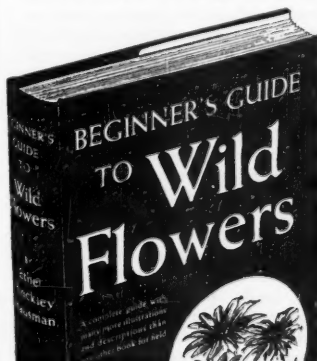
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QUESTIONNAIRE

(Continued from page 278)

cent, or 579, said that they regard sport killing as morally wrong; 298 did not; while 257 had no opinion.

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To the question about increase in wilderness areas and inviolate wildlife sanctuaries, we found that 1031 favored increase in both, while 93 did not.

We were rather surprised at the preponderant lack of enthusiasm for the rural billboard, for 1007 were in favor of its restriction, while only 127 were not, or did not care.

Turning to advertising, we asked three rather academic questions, more out of curiosity than any intention of changing our policies of long standing. We found that 639 were opposed to the use of arms and ammunition advertising; 408 were not; 87 had no opinion. There were 583 who objected to cigaret advertising; 474 who did not; 77 indifferent. Liquor advertising was tabooed by 774; tolerated by 282, while 78 voiced no sentiment.

We discovered that 617 indicated that they now patronize our advertisers, even though there now be few. Many specific suggestions of types of advertising that readers would like to see were made. These included outdoor and camping equipment; photographic supplies; travel and resorts; much more book advertising in our field; binoculars; luggage; bus lines; garden materials and supplies; bicycles; sporting material; hobby materials; films and slides; outdoor food; radios, watches; soft drinks; candy; trailers and even insurance were among the many suggestions frequently made. Specifically, 608 said they would patronize horticultural advertisers; 580 photographic advertisers; 352 microscope advertisers; 590 travel advertisers; 717 book advertisers.

Responses to several general questions were extremely interesting. Of the 1134 responding, 232 use the magazine in school work and 551 pass it on to others. We discovered that we really get around and have a large reading public, for the figures revealed that 4827 people read the magazines going to the 1134 who answered. This shows that each copy has 4.4 readers. We discovered that 685 own their own homes; 736 own an automobile; 906 maintain a garden; 448 fish; 163 hunt.

We were interested to discover the character and extent of other outdoor and sport interest among our readers. We asked specifically how many played golf—there were 104; how many played tennis—142. Then we asked how many had other sport interest. It was our fault for

not supplying other specific categories, because the majority indicated that they did take part in other sports but only a few specified just what sport. Of those that were specific we found interests as follows: riding, 23; skiing, 2; hiking and camping, 151; swimming, 70; sailing and canoeing, 26; archery, 13; climbing, 5; snowshoeing, 5; skating, 15; target and skeet shooting, 4; flying, 2; bowling, 12; biking, 11; badminton, 2.

We found that we have an enthusiastic body of picture-takers, 830 being shutter fans. Those who travel to a considerable extent numbered 624.

We were interested in what our readers do for a living, so we asked them how they "keep the wolf from the door." We were surprised at the percentage of readers who indicated their name and address and occupation. This was 1032 out of 1134. So, in closing this summary, and again thanking all who so helpfully responded, we list the following because we find it interesting, and believe our readers will. Interest in Nature knows no one group, as witness the following:

Teachers, 161; homemakers, 108; students, 106; farmers, 66; retired, 65; business men, 44; engineers, 34; writers, 32; physicians and surgeons, 22; clerks, 20; nurses, 18; secretaries, 17; lawyers, 15; Scout leaders, 15; artists, 14; ministers, 11; professional naturalists, 11; chemists, 11; manufacturers, 10; bankers, 9; foresters, 9; mechanics, 9; railroad men, 8; postal workers, 8; draftsmen, 7; carpenters, 6; government employes, 6; executives, 6; editors, 5; dentists, 5; photographers, 5; accountants, 4; musicians, 4; insurance men, 4; camp directors, 4; cabinet makers, 4; scientists, 4. There were three each of sociologists, conservationists, grocers, orchardists, loggers, steelmen, electricians, landscape architects, biologists, research workers, printers, revenue agents, purchasing agents and contractors. There were two each of college professors, gardeners, librarians, hotel managers, apiarists, metallurgists, physicists, tool designers and druggists. Further emphasizing the variety of callings, there was one each of the following among the responders to our questions: seaman, school bus operator, claim examiner, soil conservationist, proofreader, coal dealer, tree surgeon, humane worker, publisher, tugboat owner, poultryman, miner, broadcaster, astronomer, milkman, veterinarian, janitor, broker, engraver, X-ray technician, clubwoman, mayor, comptometer operator, architect, taxidermist, office equipment, butcher, Army officer, linen draper, buyer, canner, metal spinner, boiler maker, oil worker, elevator operator, tax examiner, market consultant, motel manager, horse trainer, truck driver, zoo director, concert manager, milk inspector, sculptor, dog breeder, diplomatist, telephone operator, Naval officer, museum curator, apartment owner, fish hatchery manager, landlord,

baker, hand weaver, capitalist, book-keeper, machine designer, sheet metal worker, potter, building manager, bookstore owner, optometrist, warehouseman, policeman, wildlife manager, public stenographer, advertising man, and transportation executive.

THE HEAVENS IN JUNE AND JULY

(Continued from page 285)

June and July, Venus will remain low in the west at sunset. On July 30 there will be an interesting close approach of Saturn to Venus. Mercury will be seen in June in the morning sky, at and near the time of greatest western elongation on June 28. It will remain visible early in July, but will be in superior conjunction with the sun on July 26, when it will pass to the evening sky. Mars will be in the morning sky during these two months. It will be too close to the sun to be seen to any advantage in June, but will become visible in the morning twilight in Taurus, not far from Aldebaran, early in July and passes from there into Gemini. In June Jupiter will rise shortly before midnight and be visible in the southeast and south for the remainder of the night. It will be in opposition to the sun on July 20, and will then be visible all night. It will remain in Capricornus throughout these two months. Saturn will be in Leo throughout June and July, northeast and east of Regulus. It will be past the meridian at sunset early in June, setting before midnight, and by the end of July it will be low in the west at sunset. On June 21, at 2:03 P.M., Daylight Saving Time, the sun will reach its greatest northern declination and summer will begin in the northern hemisphere.

Gadgets

From the McCormick Manufacturing Co., Box 125, Flora, Indiana, comes a gadget known as "AIRZ-EM" Boot Hangers. It is designed to solve the problem of what to do with wet and muddy boots and thus keep peace in the family, as well as give the boots a chance to dry out in nicely ventilated fashion. The device clamps over the flared soles of the boots without pinching or cutting. Works, too, for we tried it out on some golf shoes . . . Fanron Company, 1241 Flushing Avenue, Brooklyn 6, New York, have come up with what sounds like progress in haversack design. This is called Shelf-Pak, and has three spacious shelves, all of which are easily accessible. It was designed by a Scout leader who was sick of digging into his pack for something and always finding it at the bottom, after upsetting everything else in the haversack. There is a lightweight magnesium frame that supports the shelves and allows the pack to stand by itself.

We Point with Pride

By the time this appears in print Dr. E. Laurence Palmer, our Director of Nature Education and Professor of Nature and Science Education at Cornell, will be in New Zealand. Serving under the terms of the Fulbright Act, he will act as visiting lecturer in Nature and Conservation Education at Lincoln College, Christchurch, New Zealand, and will travel widely, lecturing at all major universities and teachers colleges. Mrs. Palmer, who is assistant treasurer of the Paleontological Research Institution, will accompany him, working with fossil mollusks in cooperation with the New Zealand Geological Survey. Working at high speed, "Eph" Palmer has gotten sufficiently far ahead with his material for *Nature Magazine* to assure no interruption.

Another of our staff members attains his meed of fame by contributing the article, "Wildlife Conservation," to the 1949 *Britannica Book of the Year*. This is Howard Zahniser, our book editor, who is also secretary of the Wilderness Society, editor of *The Living Wilderness*, and chairman of the Natural Resources Council of America.

New Biology

Biology: Its Human Implications. By Garrett Hardin. San Francisco. 1949. W. H. Freeman and Company. 635 pages. Illustrations by Evan L. Gillespie. \$5.00.

This is one of a series of biology texts being brought out by the publishers under the editorship of George W. Beadle, Ralph Emerson and Douglas M. Whitaker. This immediate volume is a textbook for college biology, and one that the author has planned to meet the need of the student who may never again be exposed to formal instruction in the subject for which this book supplies the basic text. He recognizes that there are certain biological generalizations that should be a part of the intellectual equipment of every well-educated individual; that a minimum of technical details should be supplied as a firm basis for these generalizations; that these details should bear upon human welfare and human problems. The author regards the "scientific method as an art—and is governed by this view in his treatment—and has written a book that is a closely integrated whole rather than one to be adapted to a variety of approaches. With the obvious careful planning that has gone into this text, the author has achieved a stimulating basic biology, and the illustrations effectively support the text.

Timbers of the World

A Concise Encyclopedia of World Timbers. By F. H. Titmuss. New York. 1949. Philosophical Library. 156 pages. \$4.75.

This is a useful reference work for users of nearly 200 different timbers found throughout the world. Commercial and macroscopic aspects are discussed.

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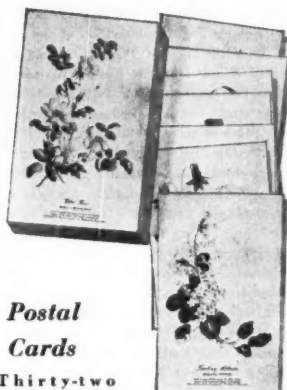
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DISNEY FINDS THE FUR SEALS

(Continued from page 262)

of learning more about this phase of the seals' life is, however, going forward at this time, under the direction of the Fish and Wildlife Service. Since 1947 the motorship *Black Douglas* has been used to follow the migrating herds; and, as part of the study, some 20,000 seal pups have been marked with metal tags. The "Seal Island" True-Life Adventure film, in its animated map sequence, has employed the best available data. Roughly, we may say that the bulls and older bachelors spend their time at sea in the Gulf of Alaska, and just south of the Aleutian chain of islands. The younger animals go still farther south, covering a wide area; while the cows, covering the greatest distance of all, are frequently seen off the coast of southern California. In these waters—according to recent and highly confidential reports—vain little cows have been heard barking near shore: "Hey, Walt! How about some more pictures like *Seal Island*?"

DEW: NATURE'S MIRACLE

(Continued from page 265)

memory reaches, the dew always has been heavy in Palestine and Egypt. Consequently, there are twenty-three references to dew in the *Old Testament*, it being mentioned in seventeen of the thirty-nine Books. In many of these Biblical references, dew is used as a synonym for blessing or good.

One of Webster's definitions calls dew an emblem of dawn, or of morning freshness, purity, or vigor, as the dew of one's youth. This is the use given to the word in the 110th Psalm, where Jehovah, in giving dominion to King David, told him "thou hast the dew of thy youth."

When Isaac blessed Jacob, under the impression that it was Esau, he did so in these beautiful words: "God give thee the dew of heaven."

We are told, in both Exodus and Numbers, that when the Lord sent manna to the Israelites in the Wilderness it always fell at night, upon the dew.

On two occasions the Lord sent the dew as a sign to Gideon—once on the fleece and once on the ground. When Elijah prophesied against Ahab he vowed to withhold the dew, as well as the rain. And in Proverbs we are told: "The king's wrath is as the roaring lion; but his favor is as dew upon the grass."

Shakespeare refers to "The golden dew of sleep."

Kipling, in "The Five Nations" sang the praise of one of the earth's most interesting mysteries.

... the dew-pond on the height

Unfed, that never fails.

These dew-ponds, still used for watering cattle on the chalk downs of Kent

and Sussex, are relics of Neolithic man. Until very recent years they had mystified scientists as well as laymen, because there is no visible source of their water supply. They stand on high ground into which brooks and other streams cannot drain, yet they nearly always retain a fair quantity of water when the low-level ponds are empty.

Because these ponds contain water when rain-fed ponds are dry, it was long supposed that they must be replenished by the heavy dews on clear nights, hence their name. Recent investigations, however, indicate that they probably are filled by the condensation of the heavy fogs and mists that hang over them during cloudy nights. Their more poetic name still clings to them in spite of these findings. Whatever their source may be, they can be depended upon to supply water when the ponds in the lowlands are empty. That is why Jack and Jill (and all their neighbors) went up the hill (to the dew-ponds) to fetch a pail of water.

GRASSHOPPER MICE

(Continued from page 266)

found. It is unwise to try and keep grasshopper mice together, or with other mice.

In southeastern Saskatchewan these large, elusive mice are found on the edge of the park-belt, generally in bare areas where the vegetation is sparse or closely grazed. While they can do their own digging, they seem to prefer to use the deserted dens of Richardson's ground squirrels, and the entrances are never concealed. The nests are made of soft, dry grass, and the five or six young ones are born about the second or third week in May. Although grasshopper mice are flesh-eaters with definitely carnivorous—even cannibalistic—habits, they are easily handled and rarely attempt to bite. While they apparently hibernate on the northern prairie, I have never been able to ascertain whether they store food for use in the cold weather. However, it seems reasonable to suppose that they do, because they spend a long time underground.

BOULDER'S PRIVATE GLACIER

(Continued from page 274)

was nearly vertical. The altitude of North Peak is 13,560 feet, that of South Peak 13,348 feet.

Arapaho is the highest of a small group of peaks on the Continental Divide known locally as "The Arapahos." There are several of them, nearly equal in height, but they seem to form practically one mountain. The peaks, with their spurs and connecting ridges, nearly surround a large enclosure, in which the north branch of Boulder Creek rises. In the southern part of this enclosure is a well-defined, deep, steep-walled amphitheatric recess, known geologically as a "cirque."

Such a cirque creates exceptional advantages for the accumulation and preservation of ice and snow. The surrounding ridges, peaks and spurs form barriers, behind which the drifting snow accumulates during the winter. Thus, from whatever direction the wind is blowing, except from the northeast, its velocity is checked by the peaks and ridges forming the walls, and so the cirque receives its burden of snow. Sometimes the summer's heat is not sufficient to melt away these drifts.

And so, say the geologists, the glaciers occupying the heads of such valleys receive snows from the winter storms, and this is transformed into rivers of ice that move slowly down the valley until checked by melting. Arapaho, say the geologists, moves forward about twenty-seven feet a year. A series of years with lower temperatures and increased snowfall would cause it to advance farther than usual; several years of warmer seasons cause it to melt away faster.

"As a glacier grinds down the valley," says *A Guide to the Geology of Rocky Mountain National Park*, "sweeping away projecting points of rock and straightening its course, the cliffs are undercut. Rock slides pour masses of earth and rock fragments upon the surface of the ice. As the ice continues its flow, it comes into lower and warmer altitudes, until, finally, the point is reached at which the ice melts as rapidly as it advances. Here the load of boulders, gravel and sand which it carries is piled in a ridge along its melting front. Such a ridge is called a terminal moraine. The material which is plowed up and dumped along the sides of the glacier is called the lateral moraine."

"If the general climate grows warmer after a terminal moraine is formed, the ice front melts back until it stands at a higher altitude. At this point where melting and rate of advance just balance, another terminal moraine is built. Such a moraine is called a recessional moraine. Most of these moraines form natural dams across the valleys, producing the lakes for which this mountain country is famous."

It was cold and windy up on the saddle, and a strong gale was threatening. After a sandwich or so was eaten, and a brief rest, the weary climbers prepared for the descent. There was less order, and more visiting on the way down. The three groups had become stragglers. Once more I looked for ptarmigan—and again they proved elusive.

At long last we struggled wearily into the Base Camp, and to the hot dinner waiting us. Surely nothing ever tasted as good as that thick pea and vegetable soup. And hot coffee, cup after cup of it. Then good-byes were said and cars began going down the mountain roads. The Boulder Chamber of Commerce had staged another successful "Glacier Day" with people participating from thirty-two states, and from Hawaii, Jugoslavia, and the Philippines.

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A place where members of the American Nature Association and readers of *Nature Magazine* may find many interesting offerings or may advertise themselves, at low cost, for things wanted; things they have for Sale, for Trade, for Sale or Trade. This is an excellent forum for acquiring or disposing of such items as binoculars, books, cameras and photographic equipment, magazines, sports and outdoor equipment, etc.

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Under the Microscope

By JULIAN D. CORRINGTON

ON BREAKING INTO PRINT

THE urge to commit writing-for-publication is a universal human characteristic, often mentioned or discussed in other writings-for-publication. Shakespeare's "All the world's a stage," includes "And then the lover, sighing like a furnace, with a woeful ballad made to his mistress' eyebrow," and Poe has given the embryonic author explicit directions in *The Literary Life of Thingum Bob, Esq.* If you would woo the muse, you can obtain instructions on how to scan her feet, or you can buy a handy little volume on how to write a Ph.D. thesis. As in other spheres of interest, there are many How-to-do-its, their total number in America probably exceeded only by the Hoo-dunnits.

The present writing-for-publication, however, will deal with what you should do about it should you make some interesting observation or discovery in the natural history or scientific field and have never written for publication before—or, at least, not successfully. You may or may not feel the urge, but you owe it to your contemporaries and to posterity to record that bit of research you performed, or describe that improvement you made on Dr. Traprock's stem-winding microtome. Remember! It was a chance observation that bacteria failed to grow in the vicinity of a culture of the mold *Penicillium* that led to a modern technique in medicine of major importance. This is not to say that all or even many stray bits of work will ever assume kindred value; but you never can tell. And things and events can be interesting without also being important, and what interests you will certainly interest others. So get busy and write it down or, should we say, up?

"But I can't write!" you say. Nonsense, anyone who can speak reasonably grammatical English can say on paper what they have done or seen. The object of the game, in a scientific as opposed to a literary article, is not to try to impress your readers with your fluent style and your vast erudition, but simply to state the facts, and simply is the word. You are not writing a novel. Buffon could well say "*le style est l'homme même*," but we cannot all be Buffons, nor do we need be. The best rule is, first, to have something to say, and second, to say it as if you were talking to or explaining the matter to a friend. If your ordinary speech is too colloquial, the slang can be ironed out in favor of a somewhat more formal presentation, but it is a mistake to become pedantic or to employ long, little-used, or technical words when more familiar synonyms and a simpler construction will serve as well or better. Your first duty to your reader is to be clear, to make yourself understood; and the direct approach in simple language is always to be preferred to rambling, polysyllabic locution.

In regard to *what* to say, the main concern will be to check and double-check on all statements of fact, and not to try to theorize as to causes, reasons, or functions unless you are an expert in the particular field; nothing exposes one's ignorance more surely or quickly. Sweeping generalizations are risky. "All organisms must have access to free oxygen for respiration" sounds safe enough at first thought, but if you should break into print with this gem, you will receive numerous letters from others who know more about the subject than you do, reminding you of the anaerobic bacteria.

A teleological statement is one indicating a purpose or

design in Nature and is strictly to be avoided in all science work. Example: "The frog has a sticky tongue because it needs such a tongue to catch insects," is a very faulty way of putting the matter. The "because" is the chief criminal in this case, the "needs" is his accomplice. Animals do not "get" structures or functions out of need; that is wishful thinking. To say, "Because of its sticky tongue, the frog is able to catch insects," is a great improvement, but errs in putting all the work on the tongue. The frog also uses its eyes, nervous system, muscles, and, in fact, must put forth a concerted effort on the part of most of its organs to be able to catch prey. A more conservative wording, not open to these objections, would be: "The tongue of the frog is flexible and sticky and can be flipped out so as to capture insects." Note that this is a simple exposition of fact, without trying to assign causes or reasons.

The inexperienced writer may blunder into a *non sequitur*, but only if his thinking is sloppy. This phrase means, "it does not follow," and describes an inference that does not follow from the premise, as "since fish are cold-blooded vertebrates, they breathe by means of gills." It is true that fish are cold-blooded vertebrates, and equally true that they breathe with gills, but the two facts are not related as cause and effect.

For the inexperienced, a word of caution is necessary concerning originality. We have seen "articles" by well-meaning youths that were copied verbatim, or nearly so, from some standard work, such as Lull's *Organic Evolution*. The "author" liked what he read and thought the material should be passed along to others. It is necessary to remember that material in print is copyrighted and cannot be reproduced without permission in writing from author and publisher. Should the editor, in such a case, slip up and fail to detect this innocent copying of someone else's work, the journal in question might be in for a suit for damages. The permission to quote is readily obtained, but the source must be acknowledged in the article. Scientists are especially scrupulous in this respect, not wishing to claim as their own the work of another.

No one today can know everything. It is not an admission of ignorance or incompetence to state the sources of your information. For instance, a new text just published is *College Zoology*, by Hunter and Hunter, a volume of more than 800 pages. No one imagines that the two authors discovered all of the material within these pages themselves. There have been many dozens of college zoologies written by as many dozens of authors during the past century, each building on its predecessors and adding new facts here and there or a fresh approach with new illustrations. The Hunters use up a full page of the Preface in acknowledging their indebtedness to no less than thirty-nine named persons.

Generalizations are, of course, common property, and it is perfectly permissible and proper to write a summary of known facts about some group of organisms, for example, that contains little if any original findings. In such a case the organization of the article and method of presentation of material, or the slant for a particular audience, may constitute the original contribution of the writer. As an instance, we have in mind an article on classification of the protozoa for beginners. If the actual writing is original, the facts need not be; indeed, they cannot be, having been known for many years to all students of zoology.

Having secured permission, you may quote from some other author, or may paraphrase his wording, giving due acknowledgment. Here are some examples:

"According to Guyer (p. 43), small white objects should be tinged with Congo red before imbedding to aid orientation in the paraffin block."

"Regarding the length of time for a complete mitotic division, Curtis and Guthrie state (p. 128), 'Observations on living cells growing in a nutrient medium . . . indicate that it takes about

eight minutes for the changes of the prophesie to occur."

The dots in the paragraph above indicate material omitted from the original. In each of these specimens it is expected that a full citation to author, title, and publisher or journal, will be appended at the end of the article or book.

As to *how* one informs his readers of what he has to say, there are usually choices of methods. Write in the third person, avoiding the egoistic "I." Avoid overuse of parentheses and quotation marks, two constructions most frequently abused by the novice. Frame your sentences so as to avoid these altogether, unless urgently called for by the subject matter. Underscore scientific names (as *Amoeba proteus*) and designations of articles, titles, and journals (as *Nature Magazine*). The foregoing sentence shows a proper use of parentheses. Quoted matter should, naturally, be placed within quotation marks; likewise words referred to facetiously or in derision or humor, as our remark a few paragraphs back about the "author" of a theme paper copied verbatim from a book.

Do not overwork capital initials. should it be designated as the Phylum Arthropoda, or the phylum arthropoda? No hard and fast rule can be given for this difficulty; circumstances alter usage. To play safe, use lower case. A liberal sprinkling of capitals throughout a work looks awkward or uncalled for, and, if overworked, they soon cease to mean anything. Watch your punctuation. Don't forget more diacritical marks are available than simply commas and periods. We have purposely employed colons, semicolons, dashes, and still other constructions in this article as a sample of the refreshing nature of variety. Mix long and short sentences and break up lengthy matter into paragraphs. Do not repeat the same word several times within a few lines; use synonyms or reconstruct the phrasing. Metaphor and simile are excellent occasionally, and it is nearly always wise to exemplify general statements.

Have illustrations where possible. Usually they help the comprehension of your remarks and liven up the page. They may be photographs or line drawings, according to the nature of the subject and the points to be explained. Just as there is more than one way to skin a cat, so there is more than one manner of presentation for most subjects. Consider putting your material into the form of a synopsis. Could it be graphed? How about a chart or table, or a combination of one or more of these methods with written description and/or photographs and/or drawings?

When the first draft of the article is written, go through it to throw out

the "verbal bums"—idle words that are doing no one any good. Their upkeep in composition and presswork is presently to be precisely the same as that for working words. Sample: "Everyone is familiar with the fact that" means "Everyone knows." (Quoted from Robert S. Gill, *The Author-Publisher-Printer Complex*, Williams & Wilkins, Baltimore, 1940.)

There is a handy volume by Ambrose Bierce entitled *Write It Right, A Little Blacklist of Literary Faults* (Union Library Assoc., N. Y., 1943) that will prove helpful and enjoyable to anyone having an interest in correct usage of words. Sample: "Maintain for Contend. 'The senator maintained that the tariff was iniquitous.' He maintained it only if he proved it."

An article of any length, or one dealing with a subject that has been investigated by others, demands a list of references to the literature at the end. It should not be called a "Bibliography" unless it is so exhaustive as to include practically everything ever written on the topic. The phrase "Literature Cited" is used when only works given are those referred to directly, in the body of the paper. Commonly the word "References" will be found best as a heading for this final section. Begin a citation with the surname of the author, then his initials, followed by the title. If a paper in a periodical, then the next entry is the title of the journal, its volume and issue numbers, and year of publication. If a book, the publisher is mentioned, with his location. A few specimen entries follow:

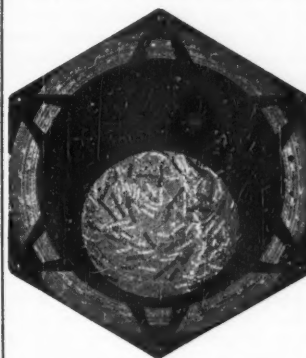
(for a book). Gage, S. H., *The Microscope*. Comstock, Ithaca, N. Y., 1941.

(for a chapter or page in a book). Adams, L. A. and S. E. Eddy, *Comparative Anatomy*, Chap. 10. Wiley, N. Y., 1949. (Note treatment of name of co-author).

(for an article). Ellis, Carlyle, *One Square Inch of Desert*. *Nature Mag.*, Vol. 35, No. 3, March, 1942, pp. 131-133; 4 figs. (the reader who may wish to consult this paper knows in advance that it is three pages long and is illustrated).

Finally, submit your article in proper form and to the proper outlet. It should be typed on 8½ x 11-inch white bond paper, double or triple spaced, with an adequate margin at the left for notations. Make a carbon copy for yourself. Send the manuscript flat, neither folded nor stapled, with your name and a condensed title at the top of each sheet, the pages numbered consecutively in the upper right corner. Give some thought to the journal selected, and do not submit an article on coal-tar derivatives to the *Journal of Heredity*. Find an appropriate outlet and follow, as closely as you can, the general style they prefer.

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BIOLOGICAL LABORATORY MANUALS

VII. Anatomy and Embryology

Since our last instalment in this subdivision, many excellent new manuals or new editions have appeared. We note something of a reaction to the notebook, spiral-wire binding style and a return to the bound volume of smaller size in many of the new offerings.

Allyn J. Waterman, Professor of Biology at Williams College, has written an interesting combination of manual and text, *A Laboratory Manual of Comparative Vertebrate Embryology*, that presents many features differing from the usual manual. We were much impressed with the excellence of the plan, exposition, illustration, and printing of this bound book. It is truly comparative, stresses fundamentals, early stages, and experimentation; there are 19 tables that condense an enormous amount of comparative information, digested from a wealth of papers in the periodical literature, and are of important reference as well as study value; the illustrations are all gathered as an atlas in the rear and are mostly splendid photomicrographs. The earlier chapters discuss the germ cells and their maturation and fertilization, induced ovulation and artificial fertilization, estrous cycles, and early embryology. In these chapters there is a preliminary review of what is known, then laboratory work, followed by references and questions. The latter half of the book describes the development of frog, teleost, chick, pig, and rabbit, and a final chapter deals with embryological technique. The author has spared no efforts to make this book completely up to date and useful. Pp. viii, 248 (text); figs., 372 on 63 numbered figs., in 60-page atlas. Henry Holt & Co., 257 Fourth Ave., New York 10, 1948. \$3.50.

The third edition of King and Roser's *Anatomy and Physiology Laboratory Manual and Study Guide* incorporates many suggestions sent in by users of earlier printings, and the section of endocrinology has been completely rewritten by Dr. E. P. Vollmer. This is a highly successful workbook, primarily for student nurses, but it is so well organized that it provides an excellent guide for others, especially the unsupervised individual working at home, or physical education students, or those taking survey courses in human biology. There are directions for dissection and study, observations to make, experiments to perform, tables, drawings, and charts to fill out, and questions to answer. The course is made as objective as possible, without dissection of the human cadaver. Mammalian or frog anatomy is substituted, demonstration specimens and slides are used and, as much as possible, the student performs tests, measurements, and experiments on herself, such as numerous blood studies. The work is organized as five Units: I, the body as an

integrated whole; II, the erect and moving body (skeleton and muscles); III, metabolism, with subunits on (A) methods of exchange, (B) heart and circulation, (C) respiratory system, (D) digestive system, (E) urinary system, (F) integument, (G) endocrines; IV, reproductive system; and V, nervous system, and appendix on techniques. This is the best work of this character we know of. It is beautifully printed and bound. A separate Instructor's Supplement is also available. Pp. vi, 267; figs. 61. W. B. Saunders Co., West Washington Square, Philadelphia 5, 1948. \$3.00.

A new book has the title *Functional Anatomy of the Mammal*, and the illuminating subtitle, "A guide to the dissection of the cat and an introduction to the structural and functional relationship between the cat and man." This smallish bound volume includes a comprehensive dissection of the cat, together with correlations between observed structure and utility, making frequent references to the living animal, and constant comparisons with man. The author is Professor W. James Leach, Temple University, who believes that such a book is needed by students of anatomy in nursing, health, and physical ed. courses, premeds taking comparative or mammalian anatomy, and others who lack opportunity to dissect the human body and who will use the cat as a substitute. In other words the emphasis is not on the cat as such, but as a stand-in for man. Thus enlivened, the subject is made far more interesting than in the ordinary straight description. The illustrations are thoughtfully chosen and are an important and instructive part of the book, which is well done and highly recommended for all who wish to master this subject. Pp. viii, 231; figs. 96. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, 1946. \$2.50.

In Adamstone and Shumway, *A Laboratory Manual of Vertebrate Embryology*, the writers dispense with all preliminaries and introductions, and get right down to solid, detailed work on frog, chick, and pig embryos. This is by far the best manual for those who wish to master detailed organogenesis, and who are specializing in the fundamental morphological aspects of the science. The student is expected to comprehend serial sections thoroughly and, while he must make a considerable number of drawings, his final achievement stands or falls on quizzes from specimens. This second edition incorporates alterations suggested by usage. The manual is a workbook, paper-covered, spirally-bound, and includes a number of well-executed and helpful drawings, blank spaces for student drawings, and marginal spaces for sketch drawings. Pp. viii, 96; figs. 38. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, 1947. \$2.00.

SONGS FOR THE LABORATORY

Good-Bye Bones

(Air: "Good-Bye Girls, I'm Through."
Sung at conclusion of work on the skeleton.)

Good-bye bones, we're through,
And though we'll not forget,
We'll say good-bye to you
Without the least regret.
We're done with all your structures,

In muscles lie our futures,
So to muscles we'll be true;

(Men) Good-bye skull,

(Women) Good-bye ribs,

(All) Good-bye bones, we're through.

I'll See You Again

(L'Envoi to the Human Skull)

I'll see you again

If any Med. School lets me in,

Time may lie heavy between,
But in my bean,
You're past forgetting—
Your lambdoidal ridge.
Your lovely zygomatic bridge—
Your simplicities belie
Hard morphologies that try
To confuse a poor G. I.—
Good-bye!

BIOLOGICAL GLOSSARY

Two of our constituents, having recovered from reading the "Battle Hymn of Evolution" in the December issue, make so bold as to presume that we would sink even lower, and offer the following. These characters inhabit the ACC House at Denison University, Granville, Ohio, and answer to the names of William H. Cox and Edward G. Voss.

Continuity of
germ plasm...study of epidemics.

Enteric cavity...vestibule of a public building.

Foregutgut between third gut and fifth gut.

Gastrulation ...indigestion in higher animals.

Guttationformation of digestive tract.

Head somite...chief body cell.

Incubationcleavage type forming cubical blastomeres.

Lininmucosa of alimentary canal.

Ovaryapplause received when scientist announces new discovery.

Recessive char-

acterextreme introvert.

Respiration ...return to life of a dead organism.

Vermiform

appendixregenerated portion of a severed annelid.



He started retiring today!

...and it feels good!

It's going to take time, but the point is . . . he's taken that all-important *first step* . . . he's found a way to make saving a sure, automatic proposition . . .

He's buying Savings Bonds, the safest investment there is, through the Payroll Savings Plan!

This makes saving an absolute certainty! You don't handle the money to be invested . . . there's no chance for it to slip through your fingers and . . . U. S. Savings Bonds

pay you 4 dollars for every 3 invested, in ten years!

Think it over! We believe you'll agree that bonds are the smartest, surest way there is to save.

Then—sign up for the Payroll Savings Plan yourself, today! Regardless of your age, there's no better time to start retiring than *right now!*

P. S. If you are not eligible for the Payroll Savings Plan, sign up for the Bond-A-Month Plan at your bank.

Automatic saving is sure saving—U. S. Savings Bonds



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